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American Foundryman

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IVITIES

November 1939

The A.F.A. and the Malleable Iron Industry

THE Malleable Division of the American Foundrymen's Association has long been confronted with a problem that is unique among the various branches due to the activities of the Malleable Founders' Society and its predecessor organization, the Malleable Iron Research Institute.

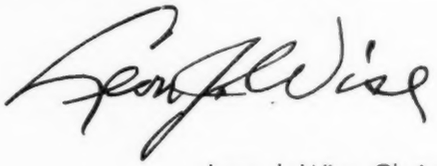
This organization, comprising nearly all the jobbing malleable foundries in the United States, has carried on a continuous and comprehensive program of cooperative research and quality control, the results of which are reflected in present day acceptance of malleable iron as a dependable material for vital parts of automobiles, trucks, tractors, freight cars, agricultural implements and myriads of other uses.

At the same time there have been many outstanding metallurgists and research workers who have contributed substantially to the progress of malleable iron through individual rather than collective efforts. We refer to those connected with co-called "captive foundries"—malleable foundries operated as a unit of a larger organization. Also in this group would come those connected with universities and other research organizations whose contribution has been significant.

Obviously each of these groups had much to contribute to the other. The most important function of the Malleable Division of the American Foundrymen's Association, in the writer's opinion, is to bring about a maximum degree of cooperation between them.

It is with much pleasure that I am able to report that today there exists a closer relationship between these two groups than ever before. A concrete example of this is the forthcoming Chicago Chapter Regional Conference wherein one of the malleable sessions is to consist of a regular shop practice meeting of the Malleable Founders' Society—open to all in attendance at the Conference.

In addition to such local activities, the Annual Convention of the American Foundrymen's Association is recognized as the medium of exchange of information from both groups, whose common aim is constant improvement in quality of product and efficiency of manufacture.



Leon J. Wise, Chairman
A.F.A. Malleable Iron Division

Leon J. Wise, Chairman of the Malleable Iron Division, A.F.A., is also Chairman of the Research Product Development Committee, Malleable Founders' Society of America. After graduation from Washington University of St. Louis in 1922, Mr. Wise served with several malleable foundry firms going to the Chicago Malleable Casting Co. in 1930 as metallurgist. Remaining with this latter company, he is now manager of research and development and assistant sales manager. Mr. Wise is a past Chairman of the Chicago Chapter of A.F.A.

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American Foundryman

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Fundamental Foundry Information

SOMEONE has wisely said—"A man who does not read has no advantage over the man who cannot read"

Practically the same words can be used to describe the plight of the foundryman who does not take advantage of the experiences of others as offered through the books and papers issued through the Association, presenting the accumulated hard bought practical experiences and technical investigation results of the many who willingly contribute for the general good of the foundry industry. The Association was formed in 1896 by hard headed foundrymen who realized the value of exchanging experiences and the large library of foundry information which has resulted in 46 volumes of TRANSACTIONS of A.F.A. is the outcome.

Two recent books are outstanding in the many contributed by members of the A.F.A. These are "The Microscope in Elementary Cast Iron Metallurgy," by Roy M. Allen, and "Alloy Cast Irons," compiled under the direction and through the efforts of an A.F.A. Gray Iron Division Committee. These books were recently reviewed in the pages of MINING AND METALLURGY by Louis Jordan. His review is as follows:

"Two excellent small handbooks (why should a handbook necessarily be three or four inches thick?) have recently been published by the American Foundrymen's Association.

"The book by Allen, covering the simple fundamentals of cast-iron metallography (142 pages), is designed for smaller producers of cast iron anxious for elementary information indicating the proper approach to the problem of producing high-quality material. The author speaks a sincere word of encouragement in his introduction to all who, recognizing their lack of technical knowledge, have the ambition to attempt self-education. Pointing out that there necessarily was a time in the lives of even the greatest authorities on the subject when they knew absolutely nothing about it, he adds 'on the basis that what one fool has done, another can do, there is hope for even the least of us.'

"The more advanced book on 'Alloy Cast Irons' covers the 'manufacture, uses and properties of modern alloy cast irons.' Its chapters deal with principles of the effects of alloying elements in cast iron; effects of specific alloys, from bismuth to vanadium, on the physical and mechanical properties; white and chilled alloy cast iron; heat-treatment; foundry practice; and in detailed tabular form list specific applications of alloy irons in a great variety of services and industries. A comprehensive bibliography concludes the book."

Members of the Association can obtain both of these books through the office of A.F.A. at a special members' price of $1.50 each.

Foundrymen Form Mutual Casualty Company

AN event of special significance to foundry executives was the licensing, on October 10, of the Founders' Mutual Casualty Company by Ernest Palmer, Illinois Director of Insurance. This new casualty company, which is licensed to write workmen's compensation and occupational disease insurance in Illinois, is the outgrowth of the American Founders' Compensation Group initially sponsored by the American Foundrymen's Association. While limited to Illinois at present, the company contemplates securing licenses to operate in other states.

Officers of the Founders' Mutual Casualty Company are: *president*, E. O. Jones, treasurer and director of safety and hygiene, A.F.A.; *vice-president*, Roger Bronson, who is in the insurance business; *secretary*, Robert D. Phelps, president, Francis & Nygren Foundry Co., Chicago; *directors*, Walter Daspit, treasurer, Vulcan Iron Works, Chicago; E. B. Hazen, president, Brass Foundry Co., Peoria, and R. M. Northrup, treasurer, Ferguson & Lange Foundries, Inc., Chicago.

When, in October 1936, the new Illinois occupational disease law became effective and it was found that insurance companies were reluctant to provide insurance for foundries, numerous foundry operators appealed to the American Foundrymen's Association for assistance and the A.F.A. board of directors authorized the association to sponsor the American Founders' Compensation Group. Mr. Jones, who had made an intensive study of the silicosis problem for the A.F.A., was firmly convinced that the insurance companies were magnifying the problem beyond its true importance. Believing that the Illinois law was a fair one and that the rates announced by the underwriters were more than ample to provide protection for the industry, a plan was evolved whereby insurance was offered to the Illinois foundries through the operation of a trusteeship under the American Founders' Compensation Group plan. The trustees collected premiums, bought reinsurance, paid losses and at the end of the first fiscal year returned $19,000 in savings to the original 21 members. This record seemed to indicate that the program of safety outlined by Mr. Jones' committee on safety and hygiene would, if carried out, result in safe working conditions in foundries.

The Group operated as a trusteeship up until the formation of the new mutual company. The loss experience has continued to be favorable and is generally conceded to be lower than that produced by any of the insurance companies writing the same class of business.

The new company, which has taken over the assets and liabilities of the group, begins business with surplus in excess of the

minimum requirements set by the State of Illinois for the operation of a mutual insurance company. It is continuing the same form of reinsurance which has provided protection for the trusteeship. Its members are carrying out the safety measures which are, in the main, responsible for the success of the enterprise.

This Illinois experiment is of value to foundrymen all over the United States, because it has shown conclusively that the occupational disease problem from an insurance point of view can be handled without excessive cost. The existence of this activity has resulted in lower rates for Illinois foundrymen from the insurance companies and it has had the same effect in other states.

Now that the trusteeship has been replaced by the new mutual, it is expected that other Illinois foundrymen will attempt to qualify for membership. Membership is available to Illinois operators who will conform to the safety program laid down by the Committee of Safety and Hygiene of the American Foundrymen's Association.

Many Attend Baltimore Conference

FROM all viewpoints, attendance, valuable practical papers, quality of speakers, discussions and general interest, the first regional foundry conference held in the Maryland, Washington, Virginia area was a decided success. With headquarters in the Lord Baltimore Hotel, Baltimore, the registration of 250 members and guests far exceeded the expectations of the conference committee.

Under the able leadership of Paul Lane, American Hammered Piston Ring Div., Koppers Co., the committee had planned well for the two days of sessions and plant visitation. J. E. Crown, Naval Gun Factory, Washington, served as vice-chairman, with other members of the executive committee being Max Kuniansky, Lynchburg Foundry Co. Lynchburg, Va.; Edwin W. Horlebein, Gibson & Kirk Co., Baltimore; C. M. Saeger, Jr., National Bureau of Standards, Washington; Edward R. Hall, Bartlett Hayward Div., Koppers Co., and Francis Kennedy, Kennedy Foundry Co., Baltimore.

The address of welcome at the opening session was given by S. J. Cort, general manager, Bethlehem Steel Co., Sparrows Point, Md. Mr. Cort stressed the value to the industry of meetings of the type being held. R. E. Kennedy, secretary, A.F.A, then reviewed the scope of the Association work.

Some eight technical sessions were carried through in the two days, these covering steel, gray iron and non-ferrous practices, with other sessions on sand and refractories. Donald J. Reese, International Nickel Co., gave two talks on cupola practice. V. A. Crosby, Climax Molybdenum Co., and R. G. McElwee, Vanadium Corp. of America, covered alloy cast iron. Max Kuniansky, with the assistance of W. Levi of the Lynchburg Foundry Co., gave an unusually interesting discussion of gating and risering special pipe fittings of the larger type, while George Evans, Mathieson Alkali Works, reviewed methods of desulphurization of cast iron. Non-ferrous practices were taken up by Roger Keeley, Ajax Metal Co., and D. M. Curry, International Nickel Co.

Various phases of steel casting production were covered by J. C. Pendleton, Newport News Shipbuilding and Drydock Co., who gave an intimate picture of the use of cement molding; A. V. Leun, Bethlehem Steel Co., who discussed refractories for steel furnaces, and H. F. Taylor, Naval Research Laboratory, who covered gating and feeding. One of the largest attended sessions was the evening meeting on the 20th, at which time H. W. Dietert, Harry W. Dietert Co., and W. G. Reichert, American Brake Shoe and Foundry Co., teamed up in presenting fundamental information on foundry sand control.

An excellent group of chairmen for the sessions did much to make the meetings successful. Those presiding at the various meetings, in addition to Paul Lane, Max Kuniansky, J. E. Crown and C. M. Saeger, Jr., previously mentioned, were H. B. Gardner, Non-Ferrous Ingot Metals Institute, Washington; C. L. Frear, Bureau of Engineering, Navy Dept., Washington, and S. W. Brinson, Norfolk Navy Yard, Norfolk, Va.

Chairmen of the various conference committees, who with

(Turn to Page 17)

Registration desk, speakers and committees at Baltimore Conference were kept busy. (Photos, courtesy R. D. Taber, American Hammered Piston Ring Div., Koppers Co.)

A.F.A. Committee Report on Heat Treatment of Steel Castings

This is one of the several committee reports presented by the committees of the Steel Castings Division before the 43rd Annual Convention at Cincinnati. The members of the committee presenting this report were its chairman, D. C. Zuege, Sivyer Steel Casting Company, Milwaukee; Werner Finster, Reading Steel Casting Div., American Chain & Cable Co., Reading, Pa.; H. H. Blosjo, Minneapolis Electric Steel Castings Co., Minneapolis; E. R. Young, Climax Molybdenum Company, Chicago, and R. A. Gezelius, General Steel Castings Co., Eddystone, Pa.

For the past several years your committee has in its annual report briefly summarized heat treating information which might be of interest to the steel foundry metallurgist and which was published during the preceding year. This year the committee has expanded its activities considerably by making a survey of the heat treating practices employed in the steel foundries during 1938. This latter step was taken for several reasons, among which are the following:

First: There have been practically no new published developments in heat treating procedure of particular interest to the steel foundrymen. Any improvements which have occurred have been in the wider and more careful application of already existing processes.

Second: Your committee believed that a survey of what is actually being done in the steel foundry today regarding the heat treatment of steel castings would be of greater value to the industry than a review of current published articles.

Third: It was desired to obtain the reactions and opinions of the industry on heat treating clauses in present specifications and to determine the producers' viewpoint regarding satisfactory hardness ranges of liquid quenched castings where such a procedure is followed.

Basis of the Survey

In order to obtain the desired information a questionnaire was sent to the industry. A fairly satisfactory response was obtained and the deductions in this report are based on the information given in 65 returned questionnaires. Of this number 22 replies were received from foundries using open hearth or open hearth and electric furnaces, 38 from foundries using electric furnaces exclusively and one from a converter shop. Four replies were received from foundries making high alloys including Hadfield's manganese steel almost exclusively. Obviously heat treating practices in these latter plants is considerably different than in the regular type of steel foundry and therefore these questionnaires are not included in tables included in this report.

Since the average weight of castings produced varied from one to 3,360 pounds and since the heat treating procedures for the larger castings are apt to vary from those used in foundries producing small castings, a division is made in the following deductions between open hearth, or open hearth and electric foundries, and electric foundries exclusively. The converter shop is included with the electric foundries. In considering the various tables in the report it should be remembered that all questions were not answered in all questionnaires.

Type of Work Produced

Table 1 gives predominating type of work and average weight of castings.

Table 1

Type of Work	Open Hearth		Electric	
	Number of Foundries	Wt. of Castings Lbs.	Number of Foundries	Wt. of Castings Lbs.
Railroad	7	100-3360	3	23-250
Pressure	1	385	4	23-80
Misc. Industrial	9	35-985	25	1-350
Railroad & Industrial	3	100-1400	—	—
Pressure & Industrial	2	100-1300	5	14-184

Type of Steel Produced

Table 2 shows the percentage of alloy steel produced in the various foundries. In this classification both the low alloys steels, including the 5 per cent chrome types and the high alloys, are grouped together as differentiated from carbon steel.

Table 2

Percent of Alloy Steel	Number Open Hearth Foundries	Number Electric Foundries
0-5	9	7
6-10	5	8
11-20	1	8
21-30	3	3
30 Plus	4	8

These data show that 45 per cent of all the open hearth foundries reporting made 5 per cent or less alloy steel while the electric steel foundries show only 20 per cent making carbon steels almost exclusively. Obviously as the percentage of alloy steels increases the complexity of the heat treatments increases.

Type of Heat Treatment Used

Of the open hearth foundries 76 per cent indicated that they are giving 100 per cent of their castings some type of heat treatment. One of the foundries producing very large castings reported that only 30 per cent of its product was given a heat treatment. Of the electric steel foundries 92 per cent heat treat all of their castings and the lowest figure for this group is 87 per cent heat treated.

With respect to the heat treatment given to the various types of steel a considerable variation was obtained. However, from the data submitted some general conclusions were drawn. For carbon steels, full annealing and normalizing are the most widely used treatments. Twenty-seven foundries replied that a full annealing treatment was given to most of their carbon steel castings, whereas 19 said that most of their carbon steel castings were normalized.

Even in the alloy compositions full annealing is quite widely used, although a normalize and draw treatment is used to about an equal degree.

Type of Furnaces Used

In the open hearth group 17 foundries reported that they used pit or car type furnaces exclusively, while only 4 foundries had hearth or box type furnaces in addition to the car type furnace. In one case a continuous 3 zone automatically controlled furnace is used.

In the electric foundries 20 reported that they did not use hearth or box type furnaces while 14 used hearth type furnaces to supplement their car type equipment. In 3 foundries continuous furnaces are used, all being pusher type. One foundry uses two continuous furnaces in tandem with a cooling space between, the second furnace being used as a draw furnace. In one case pier type furnaces are used.

Only four of the newer recirculating air type furnaces for drawing are in use in all foundries reporting.

Kind of Fuel

In making this classification all of the foundries were combined into one group. A summary of the questionnaires is shown in Table 3.

Table 3

Fuel	Number of Foundries	Percent
Oil	24	39.4
Gas	18	29.6
Electricity	2	3.3
Oil and Gas	10	16.4
Oil and Electric	4	6.5
Oil and Propane	1	1.6
Gas and Electric	1	1.6
Oil, Gas and Electric	1	1.6
Total	61	100

It was difficult to arrive at cost figures of the various fuels because many of the foundries did not report costs and in some cases labor costs were included with the fuel costs. However, on the basis of returns received, the average of 14 foundries using oil exclusively showed an average cost of $1.73 per ton, 7 using gas exclusively had a gas cost of $2.13 per ton while 4 foundries using electricity averaged $6.03 per ton for castings treated.

Temperature and Atmosphere Control

Out of 60 foundries reporting 27 or 45 per cent are still controlling all temperatures manually through guidance by indicating or recording pyrometers while 33 foundries or 55 per cent indicated that they are using automatic temperature control on at least some of their units.

Only two concerns showed that atmospheres in the furnace were scientifically controlled, one reporting that it had hand and automatic control, the other that furnace atmosphere was controlled through flue gas analysis.

Liquid Quenching Practice

In regard to the percentage of total production liquid quenched, Table 4 shows the data obtained.

Table 4

Percent Liquid Quench	Number of Foundries	Percent of Total Foundries
No liquid quench	30	49.2
1-5	12	19.8
6-15	10	16.2
16-30	3	4.9
30-50	6	9.9
Total	61	100

The most popular quenching medium is water, 19 foundries reporting that water quenching predominates. Nine foundries indicated that oil quenching was used in most cases and three indicated that oil and water were used about equally.

It was also found that in foundries doing liquid quenching, those heat treatments designed to promote toughness rather than hardness and wear resistance were the most popular. Of the 31 foundries which liquid quench some of their products, 19 reported that most of the castings were quenched to improve toughness as against seven that treated the castings to increase hardness to a relatively high degree. In six cases approximately 50 per cent of the castings treated were treated for toughness and 50 per cent for hardness. Differential treatments in which certain portions of the casting are hardened while the remainder of the casting is toughened have not yet taken a very prominent position in foundry heat treatments. Only two foundries indicated that this type of treatment predominated in their heat treating department while two others indicated that differential treatments rated about equally with treatments for hardness and toughness.

Hardness Specifications

Practically all of the foundries which did liquid quenching reported that the heat treatment was done to definite hardness specifications. However, a great variation occurred in the hardness range which was guaranteed and in the percentage of castings which were actually tested for hardness. These data are tabulated in Table 5.

In Table 5 the Brinell range in some cases was given in round numbers, while in other instances definite Brinell ranges were given and the actual spread was calculated by your committee. Based upon this survey your committee believes that the following are satisfactory ranges at the various hardnesses:

At 475	Brinell	444-514	Spread	70
At 300	Brinell	269-321	Speard	52
At 200	Brinell	187-229	Spread	38

Objections to Liquid Quenching

Although most questionnaires indicated no serious objection to liquid quenching, 14 foundries qualified their reply by stating that the casting section and composition must be satisfactory. The replies of the most drastic objections are quoted herewith:

"Difficulty in obtaining adequate compensation is only serious objection." "No objections on austenitic material, but we try to avoid it wherever

Table 5

Guaranteed Hardness Values
Range of Brinell Numbers

At 475 Brinell	At 300 Brinell	At 200 Brinell	Percent of Castings Actually Tested
65	50	25	20
105	33	34	100
100	60	40	100
50	47	15	75
50	50	50	1
—	—	—	10
—	50	35	50
100	50	50	90
—	70	42	100
50	50	30	80
—	25	50	*
70	36	38	90
—	33	34	100
75	50	40	2
50	50	30	50
50	50	50	50
97	66	50	90
100	60	40	5
50	50	28	100
—	50	50	*
—	75	50	95
131	34	20	10
36	29	30	*
30	30	20	*
50	50	50	100
70	50	38	80
Ave. 69	50	38	

*In the last column * indicates that the type of casting determines the quantity actually tested.

possible on other material, especially in intricate castings, due to possibility of cracking, warpage, etc." "Most designs do not lend themselves to liquid quenching," "Yes, in general." "Not permissible under specifications to which we work." "Object to liquid quenching on castings of intricate design involving drastic change in metal section."

Heat Treating Clauses in Current Specifications

In reply to a question as to whether heat treating clauses in current specifications were satisfactory 15 foundries suggested changes in various specifications. In six questionnaires exception was taken to the fact that in certain government specifications only full annealing was allowed. It was felt that normalizing and drawing should be made permissible heat treatments in these specifications. In six instances it was believed that in some present specifications covering liquid quenched castings the restrictions placed upon a combination of chemical composition, physical properties and heat treating temperatures are too drastic. It was suggested in these replies that when physical properties are specified no restriction should be placed upon heat treating temperatures. Conversely when heat treatments are specified no definite physical properties should be required.

Preheating Practices for Alloy Steels

About one-third of the foundries reported that on alloy steels, especially if they are of the air hardening type or are intricate shaped castings, a pre-heating treatment is given the castings before cleaning. Although in a few cases this treatment is given after the risers have been removed, in most instances it is done before the burning operation and the risers are removed while the castings are hot. The temperature for this preliminary treatment varied from 1200° to 1750° F. In the majority of cases the temperature was approximately 1700° F., but three concerns reported that they used stress relieving treatments at 1250° to 1300° F.

New Developments in 1938

Only 12 foundries reported new developments in their heat treating processes. Some of these new developments were merely mechanical improvements for better performance of the standard operations. Others represented greater usage of the more recently developed procedures. The detailed replies are given below:

"Installation of automatic control on two furnaces."

"Introduction of flame hardening by which wear contact areas are locally hardened."

"Insulation and automatic temperature control added to furnaces."

"Installation of two Philadelphia car type annealers."

"Considerable increase in flame and differential and flame hardening."

"Improvement in properties by use of multiple treatments."

"Increased use in differential hardening by oxy-acetylene flame."

"The use of 950° F. drawing treatment for all castings under .35 C."

"We now use a relatively high temperature (1700-1750° F.) for a short time (2-3 hrs.), then cool in oven to just above critical, hold for a long time (6-8 hrs.), air quench, then draw."

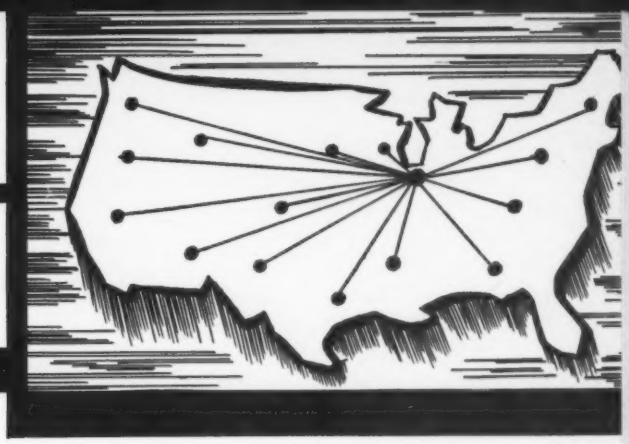
Conclusions

In presenting this annual report your committee realizes that it may not present a true picture of the entire industry, since all foundries have not reported. However, it is believed that the data obtained and the conclusions drawn are fairly representative, being based upon returns from 65 of the more important concerns.

Based upon these returns, it is evident that there is a wide difference between foundries regarding the type and complexity of heat treatments used, depending largely upon type of castings produced. Some foundries liquid quench and draw over 30 per cent of their entire production, whereas approximately 50 per cent do not quench any of their product. In some cases latest heat treating developments, such as atmosphere control, recirculating air draw furnaces and flame hardening are employed, in other instances manual control of temperature is still used. It has been the aim of your committee to present these data in statistical manner with the hope that such presentation might encourage the application of the specialized treatments for improving the physical properties of steel castings in many plants where now only full annealing or normalizing is used and to stimulate to even greater accomplishments those foundries which are already in the vanguard in this respect.

Respectfully submitted,
Committee on Heat Treatment
D. C. Zuege, *Chairman*
W. Finster — E. R. Young
H. H. Blosjo — R. A. Gezelius

Chapter Activities



Final Plans for Chicago Regional Meeting

ON November 9, 1939, at 10 a. m., the first sessions of the Regional Conference sponsored by the Chicago Chapter will open at the Museum of Science and Industry, Jackson Park, Chicago. The conference is being held for the purpose of dedicating the operating exhibit of the foundry industry in the Museum. The exhibit will be one of the few continuously operating exhibits in the Museum, and castings actually will be made. The exhibit will show the apparatus used in modern up-to-date foundries for the production of castings. The formal ceremonies for the exhibit will be held at a general assembly at 8 o'clock Thursday evening.

During Thursday and Friday, technical and shop practice sessions of interest to gray iron, malleable, steel and non-ferrous foundrymen will be held with outstanding authorities discussing current problems of interest to the respective branches of the industry. Ample time will be given for each branch of the industry to inspect the exhibit and the Museum. At 4 p. m. each day, a series of motion pictures will be held. These will in no way interfere with the technical sessions, which program has been given in previous issues of American Foundryman.

The highlight of the program will be the conference dinner at 7 o'clock Friday evening at the Palmer House, Chicago. H. S. Washburn, Plainville Casting Company, Plainville, Conn., president of the American Foundrymen's Association, will preside and introduce Colonel Frank Knox, publisher, Chicago Daily News, a keen student of political science and one of the outstanding champions of American principles. The subject of Colonel Knox's talk will be "The International Situation."

On Saturday, F. A. Melmoth, vice-president, Detroit Steel Casting Co., Detroit, will address a student conference on "Modern Castings' Application in Engineering." In addition, the motion picture, "Steel — Man's Servant," will be shown.

Refractories Discussed at Northeastern Ohio Chapter Meeting

By Edwin Bremer*, Cleveland, Ohio

NEARLY 100 members and guests attended the October meeting of the Northeastern Ohio Chapter which was held at the Cleveland Club, Cleveland, October 12. Following the dinner, Chapter Chairman Ernest F. Hess introduced chairmen of the various committees for the year 1939-40. These included Ray Fleig, Smith Facing & Supply Co., Cleveland—program; Walter Larson, W. O. Larson Foundry Co., Grafton, O.—membership; Ben Lambert, Diamond Alkali Co., Cleveland—greeting; L. P. Robinson, Werner G. Smith Co., Cleveland—entertainment; and Jim Goldie, Cleveland Trade School, Cleveland—apprentice training.

Following introduction of committee chairmen, Chairman Hess called upon Mr. Robinson to present the A.F.A. certificates of award to the several apprentices in the Cleveland district who were prize winners in the national contest held at the annual convention in Cincinnati in May. These included George Gedeon, Motor Patterns Co., first prize in patternmaking; Joseph Wyban, Gluntz Brass Foundry Co., Inc., first prize in non-ferrous molding; Stanley Burford, second prize in non-ferrous molding, and Joseph Birkenheur, Crucible Steel Casting Co., first prize in steel molding.

Prof. J. R. Strobel, University of Akron, Akron, O., presented an interesting coffee talk on apprentice training. He said that some few years ago there were approximately 6,000,000 skilled workers with 90,000 apprentices, but at present there are only about 37,000 apprentices, which calls for some serious effort and consideration. Prof. Strobel pointed out that the employer engaged in training apprentices obtains a young man or boy who is willing to listen and thus obtain the benefit of experience of the older, skilled men.

The main speaker of the evening was C. E. Bales, vice-president, Ironton Fire Brick Co., Ironton, O., who discussed "Refractories for the Iron Foundry." He discussed refractories for the cupola, pointing out that it may be divided into four sections, which comprise the zone above the charging door, the zone between the charging door and the top of the melting zone, melting zone proper, and the crucible. In the area above the charging door, conditions are not severe, and the lining only needs to protect the shell from hot gases. The zone between the

*Metallurgical Editor, THE FOUNDRY.

charging door and the top of the melting zone is subject to severe abrasion, while the melting zone must withstand intense heat, action of molten metal, slag and fluxes. It also must withstand the cutting action of the blast, breakage due to chipping during patching, and if operation of the cupola is such that the lining must undergo temperature changes, it also must withstand thermal shock. The crucible lining must withstand corrosive action of molten metal, especially if it is highly oxidized and spall resistance may be necessary if sudden temperature changes occur.

According to Mr. Bales, the present day machine-made cupola blocks are dense and hard and readily resist abrasion action of the molten metal and slag. Proper grain size and material control give the machine-made product spall resistance in spite of its density. Use of fused soda ash in foundries has led to the use of plastic refractories for ladle linings which possess several advantages. These include elimination of joints, refractoriness and workability. The plastic refractory has practically no drying or firing shrinkage and forms a uniformly hard refractory lining.

Third Regional Fall Conference
St. Louis Chapter Proves Attractive

BREAKING records seems to be the habit of chapters in their regional conference activities. This tradition was continued by the St. Louis Chapter in its 3rd Annual Fall Conference held at the Hotel Jefferson, St. Louis, October 5-7, with a record attendance of 450 members and guests from a widespread area. With ideal weather conditions, the program of plant visitations, technical sessions and luncheons and dinner was carried through without a hitch.

The high spot was the conference dinner at which the address was given by Karl Landgrebe, Vice President, Tennessee Coal, Iron and R. R. Co., Birmingham, Ala. With L. N. Shannon, Stockham Pipe Fittings Co., Birmingham, and Vice President, American Foundrymen's Association, presiding as toastmaster, Mr. Landgrebe presented an optimistic picture of the industrial, economic and civic development of the south, the extent of which development is not generally realized by our northern foundrymen.

With Lee Everett, Key Co., and Chairman, St. Louis Chapter, presiding, a luncheon gathering was held at noon on the 6th. At this luncheon T. Dysart, St. Louis Chamber of Commerce, gave an address of welcome.

The conference opened on the 5th with a large number of out-of-town guests participating in the interesting plant visitations program. The following two days were largely devoted to technical and shop practice sessions and of these it can be said without reservation that they were of the highest value from the standpoint of practical, worth while material, presented by the speakers who covered steel, gray iron and non-ferrous foundry practices.

The importance of attention to casting design was brought out in papers by A. H. Moorhead, Locomotive Finished Materials Co., Atchison, Kan., and E. B. Carpenter, American Car & Foundry Co., St. Louis. Norman J. Dunbeck, Eastern Clay Products Co., Eifort, O., and Harry W. Dietert, H. W. Dietert Co., Detroit, covered synthetic and natural sand control problems. Gating and feeding castings proved of special interest as presented by Anton Johnson, Oklahoma Steel Castings Co., Tulsa, and E. S. Clark, Banner Iron Works, St. Louis.

At the round table meetings on the morning of the 7th, the discussion leaders were G. P. Phillips, International Harvester Co., Chicago, on "Melting Practice"; L. P. Robinson, Werner G. Smith Co., Cleveland, on "Core Making"; W. F. McKee, Key Co., St. Louis, on "Application of Internal and External Chills to Steel Casting"; P. J. Dapkus, Decatur Milling Co., Decatur, Ill., on Core and Mold Washes"; and Arthur Fritschle, Federated Metals Div., A. S. & R. Co., St. Louis, on "Defects in Non-Ferrous Castings."

A feature of the conference was a meeting designed for students of the engineering and trade schools of the district. Some sixty students of Wash-

Karl Landgrebe addresses St. Louis Conference Dinner.

ington University and the Ranken Trade School heard C. R. Culling, Carondelet Foundry Co., outline the place of castings in industry. Presiding was Prof. C. L. Clayton of the Missouri School of Mines and Metallurgy.

Greatest credit for the success of the conference is due the many members of the chapter committees who served under the general conference committee, consisting of its chairman, Louis J. Desparois, Pickands Mather & Co., and L. E. Everett, Key Co., chapter chairman; W. Carter Bliss, Scullin Steel Co., chapter vice chairman; J. W. Kelin, Federated Metals Div., A. S. & R. Co., chapter secretary; Webb Kammerer, Midvale Mining & Mfg. Co.; Geo. W. Mitsch, American Car & Foundry Co., and C. R. Culling, Carondelet Foundry Co.

Hoenicke Discusses Permanent Mold Castings

By J. Morgan Johnson,* Moline, Ill.

THE Quad City Chapter began its fall meetings the evening of September 18 with Herman Alex, Rock Island Arsenal and new chapter chairman presiding. This meeting was held at the Blackhawk Hotel, Davenport, Ia., with an attendance of some 75 members and guests. Bob Feeney of Davenport gave an interesting coffee talk on his experiences in writing a column for a newspaper.

Following the coffee talk, the main speaker of the evening was introduced by A. E. Hageboeck, Frank Foundries Corp. and past chapter chairman. The speaker, E. C. Hoenicke, sales manager, Eaton-Erb Foundry Co., Detroit, took as his topic "Permanent Mold Castings." Mr. Hoenicke who had served his apprenticeship and spent many years in the foundry studying special production developments, gave an unusually interesting, informative talk as to the developments and applications of permanent molds in the various branches of the industry using metal parts. He stated the field of permanent molds has been one of steady progress in an increasingly wider field of advantages in the use of this method of producing castings. He discussed the attention to design features necessary in the making of castings and in the making of molds. This is an important feature because of the work done by the molds when the castings are poured. The advancement of equipment used for this type of mold casting was shown by slides.

Through these slides and the discussion as given by Mr. Hoenicke those present were given a very good picture of the field of castings made by the permanent mold process, the properties available and the costs of production. The discussion following the speaker's presentation made this meeting one of the outstanding sessions of the chapter.

*Tri-City Manufacturers' Association and Secretary-Treasurer, Quad City Chapter.

Sefing Talk Starts Buffalo Season

By J. R. Wark,* Buffalo, N. Y.

A MOST enthusiastic group of members of the Buffalo Chapter was present at the Hotel Touraine, the evening of October 6, to start the chapter season of meetings. A coffee talk given by V. J. Wolfe, Special Agent of the Federal Bureau of Investigation, told of the duties, qualifications and training of "G" men. The chapter can recommend to others that these F.B.I. speakers are of intense interest.

Following this coffee talk, the technical speaker of the evening, Fred G. Sefing, International Nickel Co., New York City, was introduced. Mr. Sefing discussed in a clear, informative manner the practices and properties of alloy cast iron production. His presentation was greatly appreciated as was evidenced by the many pertinent questions asked of Mr. Sefing.

*Queen City Sand & Supply Co., and Secretary, Buffalo Chapter.

Wisconsin Discusses Inspection

By A. C. Ziebell*, Oshkosh, Wis.

THE first fall monthly meeting of the Wisconsin Chapter was held September 15 at the Schroeder Hotel, Milwaukee. Chapter president, W. J. MacNeill, presided at the meeting with over 150 present. Mr. MacNeill first introduced W. F. Grimmer, Wisconsin conservation department, who gave a short talk on the 1939 game season. This talk was followed by a short entertainment under the leadership of C. N. Spidell. The main speaker of the evening was M. D. Johnson, chief inspector, Caterpillar Tractor Co., Peoria, Ill. He presented a most unusually interesting illustrated talk on machine shop control of inspection of castings.

*Universal Foundry Co. and Secretary, Wisconsin Chapter.

First Fall Meeting of Northeastern Ohio

By F. Ray Fleig,* Cleveland, Ohio

THE Northeastern Ohio Chapter started its 1939-40 season with a meeting September 14 at the Tudor Arms, Cleveland. With chapter chairman E. F. Hess, Ohio Injector Co., Wadsworth, O., presiding, more than 140 members and guests were present. The speaker of the evening was E. E. Pheneger, general superintendent, Central Furnace Dock and Coke Works, American Steel & Wire Co., Cleveland. He discussed the construction and operation of blast furnaces in detail. Mr. Pheneger's talk was supplemented by the showing of that outstanding technicolor film "Steel—Man's Servant" showing the evolution of steel from the ore to the finished product. The film was shown through the courtesy of the United States Steel Corp. This film was conceded by chapter members present to be one of the best industrial films ever shown.

*Vice President, Smith Facing & Supply Co., and Vice Chairman, Northeastern Ohio Chapter.

Quad City Holds One-Day Regional Meeting

By J. Morgan Johnson*, Moline, Ill.

BRINGING together a very creditable number (some 250) midwest foundrymen, the one-day regional foundry meeting held in the Quad Cities on October 20, was considered very successful. Sponsored by the Quad City Chapter with the cooperation of the Northern Illinois-Southern Wisconsin Chapter, AFA, the Northern Iowa Foundrymen's Association and the University of Iowa, a complete day's program of plant visitations, luncheon and dinner meetings and golf was well carried out by the committee under the co-chairmanship of P. T. Bancroft and C. F. Scherer, Davenport Machine & Foundry Co. The morning and afternoon were devoted to two general plant trips, with small groups visiting others.

Col. N. F. Ramsey, Commanding Officer of the Rock Island Arsenal, was the luncheon speaker, his subject being "Industrial Mobilization." Col. Ramsey gave a very interesting discussion on how the nation had become experienced in the ways of industrial mobilization in the World War and said that plans now were such that the country was divided in districts with all industries listed. Through this method production in the various industries can go ahead swiftly to comply with needs. Things that must be determined in advance of actual mobilization are such as what is wanted, where it can be obtained and how much is wanted. With these questions in mind private industries are given educational orders during peace time, in order to know what to expect from them when larger needs are forthcoming.

The evening meeting and dinner which climaxed the day's session was well attended, there being some 225 present, composed of foundry technicians, supervisors, plant executives and foundrymen. W. H. Doerfner, a director of AFA and general manager of the Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich., was the main speaker, discussing "The Modern Foundry." This talk was unusually enlightening as Mr. Doerfner described and showed by slides many features of the modern foundry to increase production, reduce costs and fatigue of workers, with the practical elimination of disorder in the shop. He also told of the trends in the future foundry and some of the things that might be possible due to the progress within the past few years.

*Tri-City Manufacturers' Assn. and Secretary-Treasurer, Quad City Chapter.

Dart game, shooting competition and story telling are all popular at Ontario Chapter outing. (Photos, courtesy Joseph Sully.)

Ontario Chapter Holds a Picnic

By G. L. White,* Toronto, Ontario

WITH the temperature soaring into the nineties, there was ideal weather for the picnic of the Ontario Chapter at "Barnesdale," the estate of W. R. Barnes of W. R. Barnes Co., Ltd., near Waterdown, on September 16. In spite of problems of adjusting business to a war economy, foundrymen and suppliers turned out to the number of about 100 to participate in a fine sports program and to enjoy the picnic supper at the close of the activities of the afternoon.

The sports program was prepared by the Outing Committee, consisting of C. C. MacDonald of Frederic B. Stevens of Canada, Ltd., Chairman; W. R. Barnes, the host of the occasion; N. B. Clarke of the Steel Co. of Canada; and J. Reid of Canadian Westinghouse Co., Ltd., offered as its principal events rifle shooting, golf at Waterdown Golf and Country Club, and horseshoes, with swimming and darts as side attractions. For those who wished to merely keep cool there were comfortable benches overlooking the little stream that flows through "Barnesdale."

Following the picnic supper, prizes were distributed to the winners in the various events by D. J. MacDonald, Chairman of the Ontario Chapter. W. Metcalfe was first prize winner in the rifle shooting competition, with G. L. White second, and M. Davidson third. At golf, J. W. Watson had low gross, and J. E. Wagman low net, with a number of others receiving lesser awards on various counts. Winners in

*Editorial Dept., Canadian Metals and Metallurgical Industries, and reporter for Ontario Chapter.

the horseshoe tournament were Fred. Francis and J. Williamson. Numbers were drawn for several attractive attendance prizes.

With this very successful outing as an introduction to the fall season, the Ontario Chapter is all ready to swing into its first regular meeting at Hamilton on October 27.

Northern California Chapter Holds Golf Outing

By Geo. L. Kennard*, San Francisco, Calif.

PERIODICALLY, every man reverts to type, and the members of the Northern California Chapter are no exceptions, particularly when a program committee made up of such men as Al Snow, Arthur Nelson, Mel Wilson and Pete Valentine plan months ahead for a golf and dinner party to break the regularity of technical meetings. They didn't have much in their toy bank for such an affair but the local supply men got their heads together and with their help the committee was able to get busy and show the members and friends a good time. Sequoyah Country Club was the choice, as it offered everything that a golfer dreams of and the spirit of hospitality that has made the club famous just could not be resisted by the non-golfers. October 13, falling on Friday, may have kept a few superstitious ones away, but even so, there were 62 who were not afraid and they proved it by having a rattling good time.

Advantage was taken of the opportunity to have as an invited guest Charlie Knight of the State Chamber of Commerce, who is working hard perfecting plans to make the 15th Annual Steel Conference at Del Monte a banner event, of particular interest to west coast foundrymen. Charlie's outline of the program was received with enthusiasm as he told of his eastern tour, and the support he was given by the officers of the A.F.A., several of whom will accompany President Henry Washburn on his trip in February, when Mr. Washburn will be one of the principal speakers at the conference.

Gilbert Martin of "Western Machinery and Steel World," a trade magazine strong in its support of the foundry industry, was on hand as a special friend and he covered the meeting from his point of view. Judge Sylvester J. McAtee, who has handled the legal affairs of the chapter, was also on hand to see that everything was done in proper order. Sam Russell, as chapter chairman, presided and was supported by chapter vice-chairman, Ivan Johnson, and past chairman, Clarence Henderson, in his remarks on the outlook for the industry's responsibility as this country faces the uncertainty of events depending on the disturbance in Europe. He cautioned against anyone being lulled into a feeling of security that this country would not be involved and at the same time drew attention to the fact that local sources of foundry supplies were something to be taken into serious consideration, definitely so if there should be an increase of orders for foundry products.

Ed Welch of American Manganese was selected by the program committee to distribute the four golf trophies according to merit, after which a drawing of cash door prizes was the center of interest until the boys broke into community singing, which was led by Sam Russell, who was awarded a necktie in recognition. Ernie Carr, pianist, took orders from his boss, Pete Valentine of Del Monte Properties, who contributed his stringed instrument talent to the party. To commemorate the event, Fred Mainzer of Pacific Brass Foundry had drafted Arnold Kretz, pattern maker, to design a souvenir ash tray, a quantity of which Fred cast in bronze and turned over to Chairman Russell for distribution. Those who were fortunate enough to receive one of these trays have a chapter souvenir of which to be proud.

*Secretary-Treasurer, Northern California Chapter.

Casting Sales Methods Presented to Wisconsin Meeting

By A. C. Ziebell,* Oshkosh, Wis.

W. W. ROSE, Executive Vice President, Gray Iron Founders' Society, Cleveland, spoke before the October 20 meeting of the Wisconsin Chapter. The meeting was held at the Schroeder Hotel, Milwaukee, with an attendance of over 130. Mr. Rose in his address gave an excellent outline of methods for use in the sale of castings. Those who heard him were greatly impressed by this talk which showed the importance of the foundry executive giving much greater attention to merchandising than he has in the past. Preceding Mr. Rose's talk, Capt. B. C. Richard, United Air Lines, gave a short coffee talk on "Highways of the Air."

*Universal Foundry Co. and Secretary, Wisconsin Chapter.

Wisconsin Chapter Regional Conference Committee Plans for Next Year's Meeting.

Metropolitan New York-New Jersey Chapter Studies Alloy Cast Irons

By W. A. Phair*, New York City

ALLOYS, their use and character, were explored by 60 members and guests of the Metropolitan New York-New Jersey Chapter at the chapter's first meeting of the season at the Essex House, Newark, N. J., on October 20, with Chapter Chairman W. E. Day, Jr., Mack Manufacturing Co., New Brunswick, N. J., presiding.

Pointing out that all alloys have specific uses and are not interchangeable, R. G. McElwee, Vanadium Corp. of America, the technical speaker of the evening, enumerated the properties conferred upon cast iron by the common alloys, grouping them according to their effect on carbides. He listed silicon, nickel, copper, manganese and titanium, the latter two when used in small quantities, as graphitizers and chromium, molybdenum, vanadium, and manganese and titanium in quantities above 0.75-1.0 per cent as carbide stabilizers. Vanadium, like titanium, produces a dual effect, small amounts deoxidizing and reducing chill and larger amounts strongly stabilizing carbides. One advantage of vanadium, the speaker stressed, is the unusual predictability of results when this metal is added to the mix. He presented a series of graphs showing variations in tensile strengths in a number of test bars from an unalloyed heat and in a series of brass from a vanadium alloy mix. The graph indicated that the alloy additions tended to reduce the spread between the high and low curves of the various bars.

Nickel, Mr. McElwee said, was a particularly versatile graphitizer, which hardens and toughens iron without inducing porosity. The effects of copper, the speaker thought, were not as well known as they should be and he felt that perhaps some of the observed influences might be due to other elements present in the copper additions, especially when large amounts of copper are used. He advised the use of virgin metal for more controllable results.

The speaker defined a further group of alloys or alloy combinations as process alloys—those which are used not to blanket the effects of other alloys but to prepare a more suitable base iron through the medium of deoxidization. The primary requisites for such a material were quoted as follows: (a) adequate chemistry to suitably and completely remove dissolved oxygen and nitrogen; (b) proper mechanical form to insure intermixing and diffusion; (c) formation of a fluid end-product (slag) which can be freed from the bath; (d) lack of harmful effects when present in excess; (e) high efficiency and low cost. Mr. McElwee pointed out that the Vanadium Corp. had been highly successful in preparing an alloy of this type, which is at present in use in several large foundries. The material contains 50 per cent chromium, small amounts of silicon and manganese and an accelerating agent such as calcium, barium, strontium or titanium, a combination designed to act as a strong deoxidizer but to have no effect upon the carbide stability. Data were presented to show that the addition of half of one per cent of this material to the ladle or spout was effective in reducing the chill of an automotive gray iron by as much as 50 per cent without altering the hardness of a 1.2 in. dia. test bar.

Following Mr. McElwee's talk, the assemblage participated in a lively discussion of the merits of various alloys, led by Jim Vanick of International Nickel Co., who acted as technical chairman of the meeting. Especial interest was evidenced in those alloy additions which, in addition to reducing chill areas, also act to increase the hardness of the center section of the casting.

*Associate Editor, THE IRON AGE, and Secretary, Metropolitan New York-New Jersey Chapter.

Central New York Hears First of Four Lectures on Metallurgy

By L. D. Wright*, Geneva, N. Y.

THE first fall meeting of the Central New York Chapter was held Friday, October 13, at the Onondaga Hotel, Syracuse, with 75 members and guests present for dinner, this number being augmented by late arrivals who attended the lecture.

F. G. Sefing, International Nickel Co., New York City, presented the first of a series of four lectures he is to give the chapter on "Metallurgy of Cast Iron." Mr. Sefing gave to each of those present a complete set of notes on the first lecture. This made it possible for all to closely follow the speaker and to take home the notes for reference and study. In addition, the chapter program committee provided two projecting microscopes to aid the members in following the lecture by visual inspection of sample specimens. The first lecture was given a very enthusiastic reception and the officers of the chapter feel that a great many more will be present at the next meeting. Upon the conclusion of the lecture, a quiz session was held and a great many questions were asked by members present, those not desiring to present questions before the meeting depositing them in a box.

Before closing the meeting, H. H. Judson, Goulds Pumps, Inc., and chairman of the chapter, announced that the directors had decided to have a non-ferrous speaker in conjunction with the regular speaker for the benefit of the non-ferrous members of the chapter. Max Ganzauge, non-ferrous dept., Goulds Pumps, Inc., was appointed chairman of the non-ferrous group to arrange for the non-ferrous talks.

*Supt., U. S. Radiator Corp. and Secretary, Central New York Chapter.

Pragoff Discusses Resin Bonded Cores Before Philadelphia Chapter

By J. T. Fegley*, Philadelphia, Pa.

THE 1939-40 season of the Metropolitan Philadelphia Chapter was initiated the evening of October 13 at the Engineers Club with recently elected chapter chairman, William C. Hartmann, Bethlehem Steel Co., presiding. There were over 150 members and guests present when Lee Harris, Olney Foundry Co., was called upon to introduce Dr. Hobart A. Reimann, Professor of Medicine at Jefferson Hospital, who gave an illustrated talk on "Occupation and Disease."

Chairman Hartmann announced the date of the next meeting as November 10, when Don Reese of the International Nickel Co. will discuss "Cupola Practice." The after-dinner speaker will be Captain Dwight Long, who sailed three-quarters around the globe on a 32 foot skiff. "Sailing the Seven Seas on a Shoestring" will be his subject. Captain Long recently became associated with North Bros. Mfg. Co., "Yankee" Tool Division, as a special sales representative.

The technical talk of the evening was given by Emile Pragoff, Jr., chemist, experimental station, Hercules Powder Co., Wilmington, Del., who spoke on "The Properties of Resin Bonded Cores." Mr. Pragoff brought out that cores for foundry use are made today with a wide variety of binding materials. Intelligent and economical use of these binders require a knowledge of the factors affecting their efficiency. He presented data showing the effect of various factors affecting core properties with particular reference to the results which are obtained with core binders prepared from pulverized resin. Many foundries are familiar with resin, both used as such and in the form of core oil. Recent development has made available for foundry use a higher melting pine wood resin which appears to offer considerable improvement over previously available materials.

The effect of the following variables was discussed in core making practice: 1. Binder concentration; 2. degree of pulverization of the binder; 3. baking conditions — temperature and time; 4. moisture content; 5. mixing conditions; 6. addition of silica flour; 7. effect of other binders, such as cereals, oil, etc.; 8. effect of reclaimed sand, and 9. storage of baked cores prior to use.

The results obtained show that resinous binders increase in efficiency the finer they are ground and that with proper mixing and baking at temperatures ranging from 300° to 500° F., strength and core hardness may be varied at will by regulating the binder concentration, moisture content of the core mix and length of baking time. Resinous binders are compatible with all the commonly used binders and are particularly adaptable for use with sands of high clay content or with reclaimed sand. Cores made from resinous binders exhibit unusual resistance to loss of strength on storage. Resin bonded cores are particularly adapted for use where high collapsibility is de-

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*North Bros. Mfg. Co. and Chairman, Publicity Committee, Metropolitan Philadelphia Chapter.

Job Evaluation Discussed Before Illinois-Wisconsin Chapter

By H. C. Winte*, Beloit, Wis.

THE Northern Illinois-Southern Wisconsin Chapter held its regular monthly meeting at the Hotel Hilton, Beloit, the evening of October 10. With Chapter Chairman G. J. Landstrom, Sundstrand Machine Tool Co., Rockford, presiding, some 70 members and guests were present.

As a prelude to the evening's program, C. V. Nass, Fairbanks Morse & Co., showed motion pictures taken at the chapter's outing in June. Following this, Chairman Landstrom introduced as the speaker of the evening E. L. Roth, Motor Castings Co., Milwaukee. Mr. Roth gave a very interesting and instructive discussion of the job evaluation system used in his plant. He illustrated his talk by use of slides and stressed the fact that it was more important to evaluate the job than the man. Since this system has been in use in his plant, Mr. Roth stated that the company has had very little labor trouble.

*Fairbanks Morse & Co., and Technical Secretary, Northern Illinois-Southern Wisconsin Chapter.

Philadelphia group gathers at boat launching and inspection outing at Wilmington. (Photos, courtesy W. B. Coleman.)

Sam Tour Addresses Cincinnati Chapter

By E. T. Korten,* Cincinnati, Ohio

THE second fall meeting of the Cincinnati District Chapter was held Tuesday, October 10. The dinner and meeting were convened in the Gateway Restaurant, Union Terminal Bldg., with Chapter Chairman Herman K. Ewig, Cincinnati Milling Machine Co., presiding. After the dinner, Morris Edwards, executive vice president of the Chamber of Commerce presented a very interesting and informative talk on the proposed "Bigelow Amendment." All present were impressed on the seriousness of this issue and everyone agreed to pass on to others the information presented.

The meeting then adjourned for a "seventh inning stretch," and Chairman Ewig called the business meeting to order again at 8:30 p.m. Ten new members were presented and welcomed. From the reservation cards returned, the secretary selected at random three lucky cards, and those who held these cards were reimbursed for the price of their dinner. The chairman then called for a report from the auditing committee composed of our three newly elected directors, Frank Hutchinson of the Reliance Foundry, Charles Erhart of the Chris. Erhart Foundry & Machine Co. and Herschel Kautz, of the Cincinnati Milling Machine Co. This report was read by Mr. Kautz and at the conclusion a motion was made to accept the report as read and to discharge the committee with thanks and compliment them for their splendid work. This motion was unanimously carried.

Chairman Ewig then introduced our guest speaker, Mr. Sam Tour, Vice President, Lucius Pitkin, Inc., New York City, who presented an interesting discourse on the "causes of defects in ferrous and non-ferrous castings." A question and answer period followed and the hearty applause given Mr. Tour at the conclusion was evidence of the appreciation of our chapter for the time he spent with us. Before adjourning our Chairman urged all members to reserve the night of November 14 for our proposed trip to Dayton, O., by motor bus for our November meeting.

*Reliable Pattern & Castings Co., and Secretary, Cincinnati District Chapter.

Lowry Addresses New England Foundrymen's Association

By M. A. Hosmer*, Boston, Mass.

THE October 11 meeting of the New England Foundrymen's Association was of especial interest to foundrymen of this country as the speaker of the evening was E. J. Lowry, formerly prominent as a cast iron metallurgist who for several years has been in Russia but now connected with the Woonsocket Color and Chemical Co., Woonsocket, R. I. With Francis LeBaron in the chair, the evening program was started with a coffee talk by Dr. W. Parr, chief chemist and metallurgist, Union Pacific R. R., Omaha, Neb.

Mr. Lowry, formerly consulting metallurgist in this country and active in A.F.A. work, was from 1930 to 1937 acting in a consulting capacity in Russia. In February, 1937, he applied for a visa to return to this country, but this was not received until recently. The topic of his address was "Russia Reconnoiters." After briefly explaining what the Russia five-year plan was supposed to accomplish, Mr. Lowry described the Russian people as being very clever and quick to learn. They have been taught since the World War to hate the capitalistic countries. It has been necessary to operate an American designed plant for production of tractors, automobiles, etc., with unskilled and inexperienced workers. This resulted in many cases of inefficiency because the workers were incapable of keeping up with the production for which the plant was designed.

Russia has 22 out of the 28 minerals necessary for war material production, plenty of gold, considerable of which is mined for government use only. No private property is available, everything being owned by the government, even the automobiles. Russia is now more occupied in assembling motors and planes from parts made in other countries than in manufacturing them herself. The lack of mechanical knowledge is self-evident and is shown by the fact that they cannot build these machines or even guns so that they will function accurately.

*Hunt-Spiller Mfg. Corp.

Birmingham Chapter Hears Practical Talks

By Farrar Hill*, Birmingham, Ala.

THE Birmingham Chapter held its first fall meeting at the Tutwiler Hotel, Friday, October 13, with an attendance of 145. From all indications it looks like the chapter is in for a banner year. Following dinner, the program got under way with opening remarks by W. D. Moore, president, American Cast Iron Pipe Co., who was introduced by W. Carson Adams. Mr. Moore spoke of the wonderful progress made by the southern founrymen in the past few years.

The meeting was continued with practical talks by local and out-of-town foundrymen. W. E. Jones, Stockham Pipe Fittings Co., spoke on cupola malleable iron for pipe fittings; J. M. Hutcheson, foundry superintendent, Birmingham Stove and Range Co., covered stove plate foundry practice; Arthur Smith, Hardie-Tynes Mfg. Co., spoke on molding of heavy castings; and J. E. Cardwell, Lee Bros. Foundry Co., Anniston, described some features of nonferrous foundry practice. The talks were very interesting and the meeting was enjoyed by all who were present.

*Hill & Griffith Co. and Chairman, Chapter Publicity Committee.

P. A. Paulson
Vice Chairman
Northern Illinois-
Southern Wisconsin

A. C. Ziebell
Secretary
Wisconsin

Samuel Frankel
Treasurer
Metropolitan
New York-New Jersey

E. T. Korten
Secretary
Cincinnati
District

Chattanooga Meeting Attracts Tennessee Foundrymen

By Farrar Hill*, Birmingham, Ala.

THE October 20 all-day regional meeting at Chattanooga, Tenn., drew an attendance of around 150 foundrymen from Tennessee, Georgia and Alabama. Sponsored by the Birmingham Chapter, the program for the day included plant visitations, a luncheon and dinner with technical discussions. The Birmingham Chapter was assisted in its preparations by a committee of Chattanooga members, with H. W. Anderson as general chairman; Guy Bagley, chairman, entertainment committee; J. T. Jiles, chairman, plant visitation committee; R. W. Hasselle, program chairman; Fred McGee, registration chairman, and Joe Warner, chairman, publicity committee.

At the round table meeting in the afternoon, Paul Stuff, metallurgist, Ross-Meehan Foundries, presided, with W. E. Jones, Stockham Pipe Fittings Co., Birmingham, discussing "Cupola Practice"; Charles Tidman, Columbus Iron Works, Columbus, Ga., discussing "Stove Plate Foundry Practice," and Paul Marceau, Moccasin Bushing Co., Chattanooga, discussing "Non-Ferrous Foundry Practice."

At a second session, with Wayne Nelson presiding, Charles B. Price, Norton Co., spoke on "Grinding in the Foundry," illustrating his talk with technicolor motion pictures, with Mr. Carl Carlson of the same company answering questions pertaining to "Gate Cutting, Cleaning and Grinding."

The conference dinner was held at the Read House, with L. N. Shannon, Stockham Pipe Fittings Co., Birmingham, and vice-president, American Foundrymen's Association, presiding. Mr. Shannon introduced Dr. Archie Palmer, president, University of Chattanooga, who gave the address of the evening.

*Hill & Griffith Co. and Chairman, Publicity Committee.

Chicago Hears Dr. Fox Describe Museum of Science and Industry

By L. L. Henkel,* Chicago, Ill.

WHEN the initial fall meeting of the Chicago Chapter was called to order at the Medinah Club by Chairman C. E. Westover, Burnside Steel Foundry Co., approximately 150 members and guests were on hand. Chairman Westover first reviewed the chapter activities for the year, crediting members of the various committees for their splendid cooperation in making definite plans for a successful year. He then turned the meeting over to Harold Johnson, Greenlee Foundry Co., past chapter chairman and a member of the chapter committee cooperating in the development of the foundry exhibit for the Museum of Science and Industry. Mr. Johnson introduced as speaker of the evening Dr. Phillip Fox, Director of the Museum of Science and Industry.

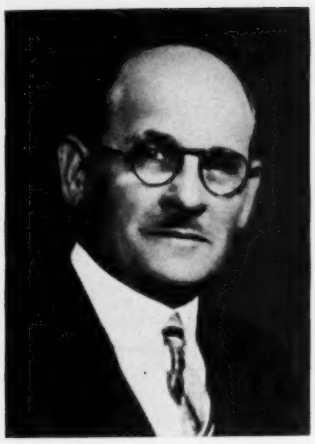
Abbott, Henkel, Martin and Westover at Chicago Outing.

Dr. Fox in his own pleasing, scientific, philosophical manner described the construction and operation of the Museum which

*Interlake Iron Corp., and Secretary, Chicago Chapter.

R. F. Lincoln
Treasurer
Northeastern Ohio

W. B. Coleman
Secretary-Treasurer
Metropolitan Philadelphia



G. L. Kennard
Secretary-Treasurer
No.thern California

H. J. Deutsch
Secretary
Detroit

is located on the Chicago lake front in Jackson Park. It is housed in a building which was originally the Fine Arts building of the World's Columbian Exposition, a building world renowned for its architectural beauty. To familiarize the general public with the working processes of many industries, the Museum is to show many industrial and scientific practices and by exhibits illustrate why such operations are used and what they accomplish.

To make the exhibits as interesting as possible as well as educational, many models have been constructed and built in such a manner that they can be electrically or manually operated. Such features as a coal mine, a miniature rolling mill and an operating foundry have been assembled for public view. The foundry will show melting in a cupola and electric furnace, molding machine production and handling and cleaning of castings with the most modern equipment supplied by various foundry equipment manufacturers of the country.

A wide range of industries and sciences are covered in the nine divisions that the Museum contains. These divisions are—Power, Transportation, Physics, Chemistry, Medicine, Graphic Arts, Geology and Minerals, Agriculture and Communication.

As one walks through the numerous rooms with their exhibits he cannot help but concur with the phrase inscribed in the great central dome—"Science discerns the laws of nature—Industry applies them to the needs of man."

Annual Stag Outing

The annual summer stag and golf outing of the Chicago Chapter was held at the Lincolnshire Country Club, September 23, with over 850 members and guests participating. With old man weather in their favor, the golfers went out during the morning and afternoon to break par club records. Those who did not golf found that the Entertainment committee had provided beer and music, a horseshoe pitching contest and scheduled a baseball game between two prominent girl softball teams. The game was watched by a large crowd with the foundrymen picking their respective teams and giving them their vocal support.

The outing was climaxed with a dinner in the evening, this being held under a large tent. Following the dinner, winners in golf and the horseshoe pitching contest were awarded prizes as were others who won door prizes. The evening was concluded with a floor show enjoyed by all.

For the success of the outing, congratulations are due P. V. Martin, and H. E. Cullen of the Carnegie-Illinois Steel Corp., chairman and secretary respectively of the Outing Committee and to their many energetic committee workers. The chapter is indeed fortunate in having such a group of men to call upon for cooperation in its activities.

Chicago Chapter members have fun at outing.

R. K. Glass
Treasurer
Buffalo

C. C. Kawin
Treasurer
Chicago

L. L. Andrus
Secretary-Treasurer
Michiana

S. R. Francis
Secretary-Treasurer
Ontario

Baltimore Meeting

(Continued from Page 3)

their committee members deserve congratulations for their efforts, were W. C. Franz, Flynn & Emrich Co., Baltimore, chairman, meetings committee; James J. Lacy, J. J. Lacy Co., Baltimore, chairman, reception and registration committee; I. N. Mosely, Norfolk & Western R. R. Shops, Roanoke, Va., chairman, attendance and publicity committee, and H. S. Schaufus, Rustless Iron & Steel Co., Baltimore, chairman, plant visitation committee.

November Meeting Calendar

November 3

Buffalo
Hotel Touraine
H. W. DIETERT, Harry W. Dietert Co., Detroit, Mich.
"Sand Control"

✦ ✦

November 6

Metropolitan New York-New Jersey
Essex House, Newark, N. J.
PAUL S. LANE, American Hammered Piston Ring Div., Koppers Co., Baltimore, Md.
"Wear of Cast Iron"

✦ ✦

November 8

New England Foundrymen's Association
Engineers' Club, Boston, Mass.
T. C. WEISER, Griffin Wheel Co.
"Manufacture of Car Wheels"

✦ ✦

November 9

St. Louis
York Hotel
T. N. ARMSTRONG, International Nickel Co., New York City
"Welding and Flame Hardening"

✦

Northeastern Ohio
Tudor Arms, Cleveland
B. P. MULCAHY, Citizens' Gas and Coke Utility, Indianapolis
"Foundry Coke"

✦ ✦

November 9, 10, 11

Chicago
Regional Foundry Conference
Museum of Science and Industry

Michiana
Joins with Chicago Chapter in Conference at Chicago

✦ ✦

November 10

Central New York
Hotel Onondaga, Syracuse
F. G. SEFING, International Nickel Co., New York City
"Metallurgy of Cast Iron"

✦

Metropolitan Philadelphia
Engineers Club
D. J. REESE, International Nickel Co., New York City
"Cupola Operation"

✦

Northern California
SAMUEL BROOKS MORRIS, Dean of Engrg., Stanford University
"Hydro Electric Development in the Northwest"

✦ ✦

November 13

Northern Illinois-Southern Wisconsin
Hotel Freeport, Freeport, Ill.
A. J. BUSCH, C. C. Kawin Co., Chicago, Ill.
"Defective Castings—Causes and Remedies"

✦ ✦

November 14

Cincinnati District, Dayton, O.
FRED G. SEFING, International Nickel Co., New York City
"Metallurgy of Cast Iron"

November 16

Detroit
Fort Shelby Hotel
G. W. CANNON and DR. C. M. COLIGNON, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.
"Safety, Hygiene, Good Housekeeping and Occupational Diseases"

✦ ✦

November 17

Birmingham
Hotel Tutwiler
D. J. REESE, International Nickel Co., New York City
"Cupola Operation"

✦

Wisconsin
Hotel Schroeder, Milwaukee
Melting Practices
Round Table Discussion by Steel, Malleable, Non-Ferrous and Gray Iron Groups

✦ ✦

November 20

Quad City
Fort Armstrong Hotel, Rock Island
M. A. SCOTT, Greenlee Foundry Co., Chicago, Ill.
"Production of Uniform Dense Structures in High Test and Alloy Cast Iron"

✦ ✦

November 24

Ontario
Carlsrite Hotel, Toronto
DR. J. RIDDERHOF, F. B. Stevens, Inc.
"Foundry Facings, Silica and Non-Silica Partings"

A Safety and Hygiene Program in a Small Foundry-III

By Peter E. Rentschler,* Hamilton, Ohio

This concludes Mr. Rentschler's paper presented before the Safety and Hygiene Session of the 43rd Annual Convention, Cincinnati, O., May 15-18. The first section on hygiene appeared in the September issue, the second section on safety in the October issue and this, the last section, covers a summary and discussion of the entire paper. The author has shown how safety and hygiene can be practiced in a small plant with the idea that healthier and safer men are better workers.

EACH year in April, the Industrial Commission sponsors an All-Ohio Safety Congress at Columbus, Ohio. The Tenth Anniversary Congress was held this year April 18 to 20. The foundries section meeting was at 9:00 a. m., Wednesday, April 19. The program looked good, and we decided that it might be stimulating to our safety and hygiene program to send more than the usual two or three to the meeting. We decided to charter a 38-passenger bus to carry our present safety and hygiene committee, the past committeemen who had served since the plan started in September, 1938, and all supervisors. At the last minute, several were unable to go, but 33 of us made the 105-mile trip to Columbus, Ohio, leaving the plant at 6:00 a. m.

We arranged to have a special luncheon meeting for our group after the foundries session. By some good luck, we were honored with having J. W. Beall, chairman, Ohio Industrial Commission, at our luncheon, as well as Mr. Barth, safety engineer. Mr. Beall gave a splendid 25-minute address to our group. Thomas P. Kearns, superintendent, Division of Safety and Hygiene, came in and spoke to our group, telling us that in the ten years of these congresses, ours was the largest group from any one company ever in attendance and commended us on our interest. Mr. Barth also talked. We had a Hamilton Foundry Safety Congress within the state congress. The exhibits were viewed after lunch. Following lunch, the afternoon general sessions were attended. A steak dinner was enjoyed en route home, and all were safely back in Hamilton at 8:00 p. m.

Safety and Hygiene Program Results

This has been a rather detailed personal experience, so a summary might be in order. The author feels that his company has:

I—Developed a Health Consciousness by

(1) By Physical Examinations.

(2) Reporting findings to each individual. Men have consulted their doctors, to our knowledge, for

Subnormal eyes	9
Cataract removed	1
High or low blood pressure	13
Sugar	5
Albumen	2
Diabetes	1
Teeth	4
Heart Condition	1
Tuberculosis	3
Hernias (various types)	7

(3) Interest in health lectures and literature.

(4) 30 hygiene recommendations to Safety and Hygiene Committee reported in 7 months.

(5) Increased use of first aid facilities.

(6) Number of members of employees' families x-rayed after tuberculin tests. All except four, who showed positive reactions, were x-rayed at the employee's expense.

(7) All employees who showed positive reactions to tuberculin tests, re-x-rayed.

II—Developed Safety Consciousness.

(1) Safety meetings: The minutes of the Workmen's Safety Committee meetings are posted in five places about the shop, and these minutes (meeting April 11, 1939, 4 sheets) are quite detailed, showing all of the points that have been discussed. Foreman's Safety Committee meeting minutes (April 11, 1939, 2 sheets) are not posted.

The accident reports are posted just as soon after the close of the month as the records (accident record March 1939, 5 sheets) can be compiled. It is our practice to mention names, so as to have specific cases for reference.

Each month prior to the safety meetings, an inspection is made for unsafe tools and equipment, and the tools are brought into the safety meeting for display and discussion. Immediately afterwards, they are posted on the special wall bulletin board on the outside of the first aid room to show the unsafe equipment.

Various inspection forms Nos. 1 to 6, were revised and expanded:

*President, The Hamilton Foundry & Machine Co.

Form No. 1: Weekly inspection of abrasive blasters' equipment.

Form No. 2: Inspection of abrasive blasting rooms and equipment.

Form No. 3: Inspection of cleaning, grinding and exhaust equipment.

Form No. 4: Inspection of watchman and fire protection equipment.

Form No. 5: Inspection record for compliance with the Ohio Industrial Commission specified safety requirements covering operations of and conditions in foundries, Bulletin No. 205, Section No. 36.

Form No. 6: Inspection record for compliance with the Ohio Industrial Commission specified safety requirements covering operations of and conditions in foundries, Bulletin No. 205, Section No. 37.

A procedure was instituted by which a member of the Safety Committee in the particular department undergoing inspection was to accompany the safety director and the maintenance foreman along with the departmental foreman in each inspection. This, incidentally, gives various individuals further experience as to safety requirements.

(2) Safety shoes in use:
November 1, 1937—none.
September 13, 1938—23 men with.
April 1, 1939—121 men with—64.5%.
May 1, 1939—185 men with—94.4%—11 without.

(3) 139 Safety recommendations reported in 7 months.

(4) Increased use of first aid facilities.

III—Improved Plant Maintenance.

(1) Correcting conditions covered by 169 safety and hygiene recommendations.

(2) 27 Maintenance recommendations.

(3) 1 Fire hazard elimination recommendation.

(4) Pride in improved appearance—better housekeeping.

IV—Accident experience improvement to be proven.

V—No great expense—No increase in personnel, as our personnel director, employment manager and safety director is all the same individual plus my own personal interest.

What is there to stimulate further interest?

(1) Schedule of safety and hygiene lectures:
(a) Chief of Bureau of Dental Hygiene, State Department of Health, Columbus, Ohio, scheduled for talk and movies.

(2) The Prudential Insurance Co., our group insurance carrier has furnished,
(a) Health literature for distribution:
(1) "Health Through Exercise."
(2) "The Common Diseases of Children."
(3) "Strong Bodies and Sound Minds."
(b) Request cards for policyholders who may wish urinalysis through the Prudential Longevity Service.

(3) Improvement in handling safety and hygiene problems as they arise due to experience.

(4) Improvement in records:
(a) For the more intelligent diagnosing and analyzing of accident causes.
(b) Plant and department comparisons over periods.
(c) Comparison of records with others through the National Safety Council.

(5) Departmental contest, as so far all work has been on plant basis—not subdivisions.

(6) Exchange of ideas with others—Improvement in "Monthly Accident Analysis and Record" due to contact with Warren Whitney, Assistant to the General Manager, National Cast Iron Pipe Company, Birmingham, Ala., who spoke at the foundries section session program at the Tenth All-Ohio Safety Congress at Columbus, Ohio, (April 1939 report 4 sheets, compare with March 1939, Page 30).

Discussion

Chairman L. C. Wilson* *(Remarks before presentation of papers)*: It has seemed to most of us that management has not taken the active interest upon which the success of safety programs in the shops depends. But I believe that recently, managements of companies are beginning to see more and more that a safety campaign can be run successfully from the top and that the interest must start there.

The American public is quite imbued with the idea of gambling and I think they are applying that to safety. The Travelers Insurance Company has found that over a period of 25 years that about 300 accidents will happen per year per family. That seems to be a pretty low percentage and the odds on taking a chance look pretty good.

That applies in the shop. Shop men figure that if the odds are going to be that favorable, (one accident in 299), they will take that chance. I feel this not only has been prevalent with the men but it has gone through the supervisory forces, strawbosses, foremen, superintendents, and I think equally it applies to management. However, I feel now that management is taking a much more active interest and that we are "going somewhere." The old theory that an accident is an accident and there is very little we can do about it, has proven false, and we are going to learn this afternoon that that theory has been pretty well exploded.

Chairman L. C. Wilson* *(Remarks after presentation of papers)*: We are indebted to both Mr. Rentschler and Mr. Doerfner for their fine papers. Mr. Rentschler has given us rather a different viewpoint on safety and hygiene. The fact that he has worked out a health program to build up his safety program, I think, is quite unusual to most of us. We are inclined, and have been, to think that a job, such as this, is only for large companies. We have learned here today that size has very little to do with it and that the determination to have good, healthful working conditions can be the inspiring influence of the whole project, if backed up by analysis and a very carefully worked out sales approach, which Mr. Rentschler has demonstrated today. We certainly have found that, without too much expense, the small foundry can carry on a program as well as a large one.

Another approach to this problem is outlined in the paper by Mr. Doerfner. Both of these men are working toward the same end. Not only are they doing something for safety and health conditions, but they are building that intangible something we sometimes prefer to call employee relations. They are contacting not only with the men and women in the plants, but with the whole family circle. That is something that is very important and cannot be estimated in figures.

Mr. Rentschler referred during his talk to what he was doing was not philanthropic in any way. Dr. Victor G. Heiser, consultant on the Committee for Healthful Working Conditions, National Association of Manufacturers, stated in an article, what I believe has a very pertinent part in substantiating Mr. Rentschler's approach through the health end rather than the safety. Dr. Heiser states that only 10 per cent of industrial absenteeism is due to accidents and occupational disease. The remainder can be laid to such things as the common cold, pneumonia, heart disease and all the other ailments of man.

Dr. Heiser states that an industrial health program essentially is a provision of healthful working con-

*Reading Steel Casting Division, American Chain & Cable Co., Reading, Pa.

ditions; such conditions are measured by the adequacy of these factors, industrial medical services, sanitation, lighting, heating, ventilating and safety. Most health programs are carried out by big companies. However, Dr. Heiser points out that nearly 62 per cent of our industrial wage earners are employed in plants having 500 or fewer employees. Further, that a survey with the National Metal Trades Association showed that in representative groups of plants, the installation of medical service cut accident rates 46.6 per cent with a 28.7 per cent reduction in compensation payments and a 15.6 per cent reduction in absenteeism.

Healthful working conditions result invariably in lower turnover, lower death rates and greater efficiency.

In this article, it is pointed out that in a woodworking plant in Ohio employing 115 men, a medical dispensary was installed at a cost of $600.00. The additional outlay for supplies and medical service amounted to $1,660.00 a year, a net cost of $14.40 per employee. The result was an immediate direct saving in absenteeism of $3,420.00. Labor turnover was reduced 25 per cent and the record shows that no major accident occurred thereafter.

This evidence, it seems to me, is worthy of serious consideration, that everyone present may take home this thought as an aid to general plant efficiency and better safety measures.

More important industrial health problems associated with the foundry industry are those related to (a) general physical characteristics of the building, (b) housekeeping practices, (c) drinking water supply—lunch room and toilet facilities, (d) exposure to extreme temperatures, (e) exposure to toxic or irritating dust, fumes and gases, (f) medical supervision.

Member: In beginning complete examination of every man in the plant, what was the reaction of the insurance carriers, the compensation carriers?

Mr. Rentschler: In the State of Ohio, we are covered by the "monopoly" you might say. The State Industrial Commission is the insurance carrier for both workmen's compensation and occupational disease. In Indiana, we had our workmen's compensation insurance with a private carrier. Then, when the Occupational Disease Law went into effect, no insurance carrier that we applied to, would take our O.D. insurance. Our workmen's compensation carrier refused to cover us for O.D. insurance.

In Indiana, if you applied to three companies and were rejected, you then could apply to the State Industrial Board for permission to become a self-insurer. If you met the Board requirements, you were granted this privilege. It seemed to me that everybody applied, or most everybody, applied for O.D. coverage to their private carriers. Most everyone was refused.

In some instances, where the private carrier had coverage for a very limited period, they covered you for your O.D. insurance until the expiration of the workmen's compensation contract and then would not renew the O.D. coverage. We went along on our own with no O.D. coverage until we got permission from the Industrial Board to become a self-insurer for O.D. At the expiration of our workmen's compensation contract with the private carrier, we applied for self-insurance for workmen's compensation, so that now in Indiana we are a self-insurer on our whole risk.

In doing that, we set up definitely a cash reserve at the Indiana Rating Bureau's rates to build ourselves up a reserve to take care of any experience we might have, if possible out of this reserve rather than to draw on other assets. We consider this building up of reserves a part of our costs.

E. O. Jones*: These papers will be reprinted and I feel that this is the start of something. I know many times in the past I have been asked to speak on this particular subject, but I quit, because I found they would say, "That is what he is paid for." When we can get men to give their time to come and prepare papers such as these, we are starting something. It is about the quickest way to make money there is these days. It is a problem that certainly has been sadly neglected. So far as management is concerned, they should start by calling in their supervising force and saying, "from tomorrow on you are 'it'." If we did that, we would clean up this problem in a hurry.

Chairman Wilson: I think you have brought up a very important point. I don't mind saying when Mr. Jones asked me to act as Chairman of this meeting, I felt, "Well, it is going to be one more meeting." But I have been intensely interested in reading both the papers that have been presented here this afternoon. In fact, I read both of them several times. And I find there are so many things I had overlooked that I am going to profit very greatly by having the privilege of being here. And I appreciate it.

Are there any more questions? Mr. Rentschler has some moving pictures he took in his plant, I think at Hamilton, and, while the meeting is almost two hours long, he would be very glad to show them to you if you are interested in staying. That is, in case you have finished with your questions now. Is it your desire he show these pictures?

F. L. Harris: Mr. Rentschler, from your paper, I take it you did not compel your men to wear safety shoes at all. It is entirely voluntary. We find in our plant, in some departments, that when we require the men to wear safety shoes, there is some objection. Your plan of educating the men to wearing safety shoes instead of compelling them to wear them, is probably a good idea.

Mr. Rentschler: When we began, we experienced all sorts of objections; that the shoes were too heavy, etc. As I understand it, safety shoes must fit a little looser than regular dress shoes. If a man knew he was getting a 7½ safety shoe and he ordinarily wore a 7 shoe, he was convinced that 7½ safety shoe would not fit. So we had the safety shoe representative come in first for a night meeting with our foremen. He brought in samples of all kinds of safety shoes, even dress shoes with safety toes and spread them all out for inspection and discussion. We let the foremen get everything off their chests that they possibly could with the shoe representative present. Finally six foremen ordered shoes, not shop type but more or less dress oxfords. Later, at our open-house, we had a display of eight or ten types of safety shoes.

Shortly before this, we had a man wearing safety shoes, operating a sand cutter, who had a front wheel run over his foot, and this merely put a scar across the leather toe. We marked the shoe toe up a little to accentuate the cut and took a protograph of it. Later we had the sand cutter operator pose, showing the sand cutter front wheel going over his foot, so that we could carry this photo on the bulletin board. We gave this man a new pair of shoes and kept the marked-up safety shoe in our permanent display case.

In the case of one or two foot accidents, we gave the man a pair of safety shoes at a discount in exchange for his old shoes. We would ask how much he paid for his shoes and ask him how worn out he felt they were, so that we could make a satisfactory allowance on them in exchange for a new pair of safety shoes. In that way, we got him to wear safety shoes, and we publicized the accident on the bulletin boards with the damaged shoes as evidence.

We had the safety shoe representative bring in an educational movie and I can assure you it was not an advertising film for that specific safety shoe, as the only reference to the particular manufacturer was the film trailer. It was primarily an educational film.

We are up to the point now, where 94.4 per cent of our employees are safety shoe shod. We have passed the word around that in another month or two it is going to be compulsory to wear safety shoes, because we have laggards who will not go along with the procession unless they are forced. If we can avoid it, we are not going to use compulsion. Some of the laggards say they have good shoes, that will be worn out in a short time, and then they will order safety shoes. We will wait a little while, and then it may become a compulsory proposition.

Since we started the safety campaign, every new applicant who comes in, is told that he must get safety shoes before starting to work. The employees do not have to get these shoes at the plant, but we do handle them at our stock room just as a matter of convenience. One of the stores uptown carries them, and a man can buy his shoes wherever he pleases.

Mr. Harris: We buy what we think is probably the best safety shoe on the market and still have the men complaining about the shoes hurting their feet. We have done some of the things Mr. Rentschler has done, taken the shoes, in the cases where men have had accidents, and posted them on the bulletin board, and so on. But, just sitting here listening to your talk, I am beginning to wonder if probably it is not a natural instinct in a man because he is compelled to wear safety shoes, to oppose it?

*Director, Safety and Hygiene, American Foundrymen's Association, Chicago, Ill.
**Belle City Malleable Co., Racine, Wis.

Mr. Rentschler: We had the safety shoe man come to Hamilton again after the All-Ohio Safety Congress at Columbus, and measure every man individually who might be interested. If a man gets shoes he feels are not right, we insist that the shoe representative give him another fitting. We have been handling this safety shoe situation with kid gloves and learning as we go.

Chairman Wilson: I think you have to handle it that way. We do not make the wearing of safety shoes compulsory. In introducing the shoes, we had a great deal of trouble. Have you ever worn safety shoes yourself? Try it. I felt in our shop that I could not ask the men or compel them to wear safety shoes unless I was willing to try it out myself, and I did. I do not go into the shop at any time now without safety shoes. I find them just as comfortable as any shoe I have ever worn. But you have to take some care in having them fitted. We have the shoe man come in and refit them where we have trouble. We have had identically the same complaint you have had, that the shoes hurt their feet. In almost every case, we found they had picked up their shoes outside somewhere and that they were not fitted for their feet. We have had success with them. While it is not compulsory, our men do wear safety shoes.

Mr. Harris: Mr. Rentschler mentioned that he made periodic inspections. Who is responsible for that inspection, your maintenance foreman, or do you have safety inspectors?

Mr. Rentschler: We have the safety director, maintenance foreman, and the departmental foreman go on the inspection with the safety committeeman of the department. The safety committeeman who may know nothing about it, merely goes along to learn a little something about the inspection, but at the same time, we feel this man is sort of a stimulant to the maintenance supervisor to make a more thorough inspection because he is being watched. The inspection is really done by the maintenance foreman, the departmental foreman and the safety director. We have one who handles safety. He is the safety director, employment manager, personnel director. He is everything in the safety program that I am not.

Mr. Harris: Mr. Doerfner, did you have any trouble with the School Board about the school children writing essays on their trip through the plant or putting the idea across in the schools?

Mr. Doerfner: The fact of the matter is, the School Board asked us for permission to do it. In the past, every year, high school students, and particularly students interested in chemistry, from the surrounding district have visited the plant. This time, the superintendent of schools, visited our plant on Monday. The next day he called up and said he wanted to bring all the kids over. We could not take care of them during that week as there were so many other people coming. Five thousand people going through a plant in about five days is a big job. We had do defer the students until the following week. We had all the children come over, with the teachers, and they were taken through in groups of 30 or 35.

Incidentally, we conducted all those people through the plant without a scratch. You would be surprised how the workmen cooperated with us. They were as proud as peacocks of their plant during that week. Another thing, our production increased 10 per cent during the time of open house—believe that one or not!

New Members

COMPANY MEMBERS

Defiance Machine Works, Inc., Defiance, Ohio (Clarence Squires, Foundry Supt.)

Great Lakes Carbon Corp., Niagara Falls, New York (George O. O'Hara, Sales Mgr.)

Ideal Pattern Works, St. Bernard, Ohio (Robert E. Schlegel, President)

Oakley Pattern & Foundry Co., Cincinnati, Ohio (Arthur Alfers, Foundry Mgr.)

Pierce Butler Radiator Corp., Syracuse, New York (Edward E. Hook, Supt.)

Taylor & Boggis Foundry Co., Cleveland, Ohio, (K. Davidson, Vice Pres. & Treas.)

PERSONAL MEMBERS

Geo. W. Anselman, Salesman, Ayers Mineral Co., Chicago, Illinois

George Benson, Supt., Taylor & Boggis Foundry Company, Cleveland, Ohio

George Black, Salesman, S. Obermayer Co., Cincinnati, Ohio

William Boehringer, Coremaker Foreman, Ohio Pattern Works & Foundry Co., Cincinnati, Ohio

Paul Carlson, Salesman, Moline, Illinois, Representing Norton Company, Worcester, Mass.

George Freiberger, Supt., Reliance Foundry Co., Cincinnati, Ohio

Joseph Hanks, Sales Manager, Taylor & Boggis Foundry Co., Cleveland, Ohio

George Johnson, Supt., Reliance Foundry Co., Cincinnati, Ohio

R. E. Kiefer, Sales Engineer, Glen Ellyn, Ill., Representing Osborn Mfg. Co., Cleveland, Ohio

Jack King, Sales Representative, Werner G. Smith, Ltd., Toronto, Ont., Canada

Adam J. Kisskalt, Foundry Engineer, Acme Foundry Co., Detroit, Mich.

W. D. Kloss, Foundry Supt. Asst., National Malleable & Steel Casting Co., Sharon, Pa.

Michael Krauser, Foundry Foreman, Ohio Pattern Works & Foundry Co., Cincinnati, Ohio

Joseph Robert Linney, Republic Steel Corp., Buffalo, New York

John K. McBroom, Chicago, Ill., Engineer Pittsburgh Lectromelt Furnace Corp., Pittsburgh, Pa.

Walter E. Oelschlaeger, Salesman, Republic Coal & Coke Co., Chicago, Ill.

W. H. Osborne, Ass't Manager, Federated Metals Div.-American Smelting & Refining Co., Whiting, Ind.

Fred A. Pampel, Foundry Engineer, Chain Belt Company, Milwaukee, Wisconsin

Ivan M. Roberts, Ass't Chief Chemist, Laclede Gas Light Co., St. Louis, Mo.

J. Richard Roe, The E. H. Bardes Range & Foundry Co., Cincinnati, Ohio

Maurice B. Schramm, Foundry Teacher, Cuyahoga Heights School, Cleveland, Ohio

H. J. Strassberger, Sales Engineer, The Dayton Oil Co., Dayton, Ohio

George S. Twachtman, Supt., The E. H. Bardes Range & Foundry Co., Cincinnati, Ohio

FOREIGN MEMBERS

Benigno Folanco, Manager—S. A. Maestranza Chile, Valparaiso, Chile, South America

Herbert Weymouth, General Manager—The Clyde Engineering Company Limited, Granville, N. S. W., Australia

Reginald W. Williams, Managing Director, Sidney Williams & Co. (Pty.) Ltd., Dulwich Hill, Sydney, Australia

Philadelphia Meeting

(Continued from Page 13)

sired. Castings up to 1½ in. in metal thickness may be satisfactorily cast against resin bonded cores. Greater metal thickness castings usually call for combinations of resin binders with other core binders.

Mr. Pragoff explained the tests made on the use of reclaimed sand in the making of cores; his records pointed out that better results were obtained when the new and reclaimed sand used was of the same grain size and when this was possible a larger percentage of reclaimed sand could be used without reducing the quality of the core. In no case, Mr. Pragoff pointed out, should reclaimed sand be used in excess of 65 per cent of the mix. Charts shown also indicated that equal parts of resin and silica flour gave better results than when used in higher percentages of either material.

Abstracts

Note: **The following references to articles dealing with the many phases of the foundry industry, have been prepared by the staff of *American Foundryman*, from current technical and trade publications.**

When copies of the complete articles are desired, photostat copies may be obtained from the Engineering Societies Library, 29 W. 39th Street, New York, N. Y.

Air Measurement

PILOT TUBES. *"Pilot Tubes in Large Pipes,"* Edward S. Cole and E. Shaw Cole, *Transactions of the A.S.M.E.*, vol. 61, no. 6, August, 1939, pp. 465-475. Comparative calibrations with two different pitometers, which react differently to angular flows, indicated the absence of angularity effects in large pipes. To check this the authors made actual measurements in two large pipes and found angularity to be less than 3 degrees. Comparisons with other methods of flow measurements in two large pipes are presented together with velocity traverses in these and other conduits. The velocity traverses show the smooth flow pattern found in large pipes at good gaging points. The authors also discuss the value of pipe factor, *i.e.*, the ratio of means to center velocity, for determining the suitability of a gaging point as well as for making short tests quickly and accurately, or for making continuous flow measurements.

Alloys

CRYSTALLIZATION. *"Process of Crystallization in Commercial Alloys,"* by W. Patterson, *Foundry Trade Journal*, vol. 61, no. 1199, August 10, 1939, pp. 99-102. The aim of this paper is intended to examine whether direct thermal analysis is suitable for studying solidification at the rates of cooling obtaining during the casting of alloys and what information can be obtained from the resulting curves. Three principles of thought are outlined in this article (1) in the investigation of constitutional diagrams, thremal analysis serves exclusively to establish the range of existence of the phases which occur, (2) the result of the thermal analysis of cast specimens can also be interpreted in a second direction, and (3) a third possibility which would be observable by thermal analysis is the detection of new crystal types due to segregation. A modified measuring arrangement on the Kurnakow principle was used in the experimental work. The results are made out in graph form and explained in the article by the author.

HIGH CONDUCTIVITY. *"Copper and Copper Alloy Castings,"* by H. J. Miller, *The Metal Industry, (London)*, vol. 54, Nos. 24, 25 and 26, June 16, 23, 30, 1939, pp. 642-646, 659-662 and 689-691. An International Foundry Congress paper presented because users desire to know the latest developments pertaining to the special high-conductivity and high-strength alloys which have become available in recent years. This paper is divided into five sections: the first dealing with tough pitch copper. Section one on oxygen and hydrogen explains the workings of both gases on molten copper—when oxygen was high, hydrogen was low and vice versa—and how in each of the above cases hydrogen affected solidification. Section two, on deoxidized copper, discloses the various deoxidants recommended and most commonly used, and then gives their effects on conductivity and properties. The third section summarizes the properties of general copper alloys which in the form of castings are used extensively for electrical purpose. Bronzes and brasses are discussed and the author points out numerous advantages and disadvantages of each metal for electrical use. Section four gives the alloys that have been developed in the past 20 years because of a better understanding of precipitation hardening principles. The author also explains the precipitation hardening process. Outstanding electrical properties of copper-chromium series are discussed and an equilibrium diagram is shown. Other precipitation hardening alloys are presented, such as copper - nickel - silicon, copper - cobalt and copper-beryllium alloys along with figures showing their properties and compositions. Section five is limited to a consideration of the procedure suitable for deoxidized copper and copper containing chromium additions. Melting procedure is explained in detail, particular attention being given to the causes and effects of absorption of various gases. Some amount of success has been met by using fragile molds and cores in combatting the weakness of copper at temperatures just below the freezing point. Shrinkage is due to an extremely narrow solidification range and it was found necessary to provide heads and risers of generous size. A condensed discussion on the author's paper is also of great interest.

LEAD CASTINGS. *"Antimonial Lead Castings—Thin Molding and Finishing,"* by Nathaniel Hall, *Metal Industry, (London)*, vol. 54, No. 25, June 23, 1939, pp. 673-674. The author discusses the methods used for molding and finishing castings of the type indicated in the title of the article, particularly slush castings. He points out that such castings can be plated satisfactorily by first cleaning electrically in a soda ash and trisodium phosphate solution at about 190° F. and rinsed, immersed in a solution of 25 per cent by volume hydrocloric acid solution and finally immersed in a sodium syanide solution. Following such treatment castings may be gold, silver, copper, chromium, brass or nickel plated. The latter part of the article explains methods used to secure various finishes.

LIGHT ALLOYS. *"The Effect of Melting Conditions on Light Alloys,"* by A. J. Murphy, S. A. E. Wells and R. J. M. Payne, *Foundry Trade Journal*, vol. 60, No. 1191, June 15, 1939, pp. 528-530. The authors show that while aluminum can be melted in cast iron pots if the pots are properly prepared and the correct precautions are taken, magnesium can be melted in cast iron pots without any fear of contamination by iron. To determine the effect of repeated fluxing the authors selected an alloy containing 1.3 per cent copper, 2.2 per cent silicon, 1.3 per cent nickel, 0.1 per cent magnesium, 1.0 per cent iron, 0.1 per cent niobium and remainder aluminum. The authors found a steady decrease in the magnesium when the metal was remelted and treated each time with a flux containing two parts sodium chloride and one part sodium fluoride. On each refluxing, 2 per cent by weight of the flux was used. With the decrease in magnesium, brinell hardness and tensile strength decreased while elongation rose. When the alloy was remelted for an equal number of times without flux, no change in magnesium content nor in properties was noticeable. In magnesium alloys, there was no change in composition after many meltings under fluxes containing chlorides and fluorides. The authors also studied the effect of maximum heating temperature on aluminum alloys and found that regardless of the pouring temperature, if the metal has been heated to too high a temperature, large grain size would result. They further point out that the use of niobium in small amounts, 0.10 per cent, refines the grain in aluminum alloys. With regard to maximum heating of magnesium alloys, the authors point out that the properties of magnesium alloys are increased with superheating.

MELTING. *"General Principles Applicable to the Compounding of Alloys by Melting,"* by Albert Portevin, *Foundry Trade Journal*, vol. 61, no. 1202, August 31, 1939, pp. 157-159. The problem on hand, which this article is concerned, is to produce economically a liquid homogeneous alloy, ready for casting, without changes acting adversely against the useful properties of the casting. Two fundamental factors make up the solution of the problem and they are raw materials and melting conditions. Raw materials means virgin metals, scrap, master alloys or alloys compounded under special conditions and of a composition different from that of the desired alloy and additions made with diverse objects. Taking up melting conditions this is divided into three parts, methods of heating and type of furnace for the melting of alloys, melting atmosphere and furnace chamber or melting medium. The principles of melting industrial metals takes into consideration the physical; boiling and volatilization, chemical; action of the gases of the

atmosphere and the reaction on the walls and the fluxes and crystalline. Each one is discussed individually. This article is continued. (A1.)

Analysis

SPECTROSCOPIC. *"Routine Spectroscopic in Analysis in Ford Motor Co. Foundry,"* by H. B. Vincent and R. A. Sawyer, *Metal Progress,* vol. 36, no. 1, July, 1939, pp. 35-39. This is an article on the new spectroscopic laboratory developed by the University of Michigan for Ford Motor Co. The process of analysis comprises the casting of suitable samples of the molten alloy, the burning of the sample with an electric spark, a photographic recording of the spectrum of the light produced, the processing of the photographic plate, measuring the density of selected spectral lines, and interpreting these readings into percentages by a calibrated transposing machine. The operation is so fast that the analysis of a sample may be posted within six minutes of the time it is received by the laboratory. Individual steps of the procedure are discussed in the article. (A.)

Castings

ALUMINUM BRONZE. *"Producing Aluminum Bronze Castings,"* by N. K. B. Patch, *The Foundry,* vol. 67, no. 10, October, 1939, pp. 25-26, 90, 92, 94. There are two methods of producing aluminum bronze in practice today. The first is to buy aluminum bronze in the form of ingot metal from manufacturers who can give the product with the analysis desired. The second method is melting of aluminum bronze mixture in a crucible. Emphasis is placed on the fact that the problem of avoiding gassing of aluminum bronze is old but must be stressed in this composition. Three precautions are pointed out in making castings of aluminum bronze. They are: (1) the metal must be melted in an oxidizing atmosphere, to eliminate unburnt gases, (2) all molds must be rammed carefully so that hard or wet spots will not cause agitation of the metal during entrance to the mold or during solidification, and (3) gating of aluminum bronze castings must be such that the metal enters the mold without agitation of any kind. In the pouring practice of this metal it was pointed out that a sprue which is kept full and poured by a steady stream gives the best results. Another precaution that is mentioned to the reader is that risers must be of adequate size to insure proper feeding of all castings made in aluminum bronze. Heat treating of such castings will enhance to a considerable degree some of the physical properties, but not all at the same time. (C.)

CHILL. *"Chill Casting Light Metals,"* by E. R. Thews, *Canadian Metals and Metallurgical Industries,* vol. 2, no. 8, August, 1939, pp. 187-191. The fact that chill casting of light metal alloys is considered a difficult and tricky matter, even by many experienced foundrymen, is due not only to the inherent difficulties of this branch of light metal founding, but to neglect or misapplication of important special characteristics. These characteristics are not directly bound up with physical theory, but are governed to a large extent by purely practical considerations influenced, of course, by physical and chemical fundamentals. These characteristics are discussed in the subjects on chill molds, mold materials, mold design, surface treatment of molds, pre-heating temperatures, alloys and pouring temperatures, pouring technique, mold position and special cooling of sections. Drawings are included illustrating certain ideas. (C.)

SOLIDIFICATION. *"Control of the Solidification of Castings by Calculation,"* by N. Chvorinov, *Foundry Trade Journal,* vol. 61, no. 1199, August 10, 1939, pp. 95-98. The author first gives a clear picture of crystallization and solidification. He mentions the variables that influence crystallization; which are temperature gradient, chemical composition, purity of metal and gravity. A few comments are made on progressive solidification and how castings solidify. The next step is to take the mathematical solution of the progress of solidification of a semi-infinite mass of metal and find the solidification constant. With the conviction that controlled directional solidification can be obtained if the thermal properties of a mold are suitably changed, the author turns his attention to materials that may be used in molding. Direct chilling means, semi-metallic chills and indirect chills are then discussed. (C.)

Cast Iron

HARD. *"Specially-Hard Alloy Cast Irons for Resistance to Abrasion,"* M. H. Hallett and A. B. Everest, *Foundry Trade Journal,* vol. 61, no. 1195, July 13, 1939, pp. 23-26. This paper was presented before the International Foundry Congress held in London. The question of alloyed chilled cast iron is an extremely wide one. Characterists of some of the alloyed irons for chilled castings such as rolls have been discussed. In this paper attention is given to the smaller types of castings which would be made in a sand mold and which are of such section that they would cool quickly to room temperature. Chilling is applied mainly for the purpose of developing a white structure at least for part of the section thickness of heavy castings, where normally, due to the slow cooling of such castings, it would be impossible or difficult to obtain the white iron structure. Sand castings, however, may successfully be employed for lighter castings in white iron. Due to the more rapid cooling of such castings, certain changes in the alloy content may be desirable to obtain best results. Furthermore, it is not necessary to maintain the strict balance between graphitising and carbide-forming elements in the case of sand castings as these are merely required to solidify with a structure as completely white as possible. (C.I.)

CASTING TEMPERATURE EFFECTS. *"The Effect of Casting Temperature on the Primary Microstructure of Cast Irons,"* by A. L. Norbury, *The Iron and Steel Institute Preprint No.* 8, September, 1939, pp. 1-15. Treatments of the melt which refined the graphite eutectic structure in gray cast irons were not found to have the same effect on the iron-carbide eutectic in white cast irons. Differences in casting temperature did, however, produce remarkable differences in the primary microstructure. In hypereutectic white iron compositions, lower casting temperature greatly reduced the size of the primary carbide plates. In hypo-eutectic white iron compositions, it refined the dendritic structure of the primary austenite, so that it became replaced by a globular austenite structure. These signs were interpreted as showing that primary dendrites result from the joining up of globules, and that large primary plates result for the joining up of smaller plates. In cast iron compositions, carbon is similarly assumed to be in the diamond form in the liquid state and to form a diamond-iron compound (iron carbide) when it solidifies without allotropic change, but to form graphite, as above, when it solidifies with allotropic change. (C.I.)

THERMAL CONDUCTIVITY. *"The Thermal Conductivity of High-Duty and Alloy Cast Irons,"* by J. W. Donaldson, *Foundry Trade Journal,* vol. 60, No. 1191, June 15, 1939, pp. 513-516. The author reports on the continuation of his investigations of the effect of various elements, on the thermal conductivity of cast irons. Both plain irons and irons containing copper, chromium - molybdenum, molybdenum, nickel-chromium, manganese-nickel and three of Poisson's ratio, either in tension or corrosion resistant irons, two containing high percentages of nickel with chromium and the other containing a high percentage of aluminum, were investigated. The author reaches the following conclusions: (1) The thermal conductivity of gray iron is lowered by copper in a similar manner to which it is lowered by silicon and nickel, the influence of copper being approximately half that of silicon, (2) molybdenum tends to raise the thermal conductivity of gray iron, similarly to chromium and tungsten although its effect is not so pronounced, (3) when nickel and chromium or nickel and manganese are alloyed together, the influence of nickel in lowering the thermal conductivity is counteracted to a slight degree by either of the other two elements mentioned, (4) a large proportion of nickel has a pronounced influence in lowering the thermal conductivity of cast iron, but where part of the nickel is replaced by copper the influence is not so marked, (5) aluminum, even in the presence of chromium, has a very pronounced influence in lowering the thermal conductivity of gray iron.

Centrifugal Castings

BRAKE DRUMS. *"Iron Lining Fused Centrifugally to Steel Brake Drum Shells,"* A. H. Allen, *Steel,* vol. 105, no. 6, August 7, 1939, pp. 46-50. Production of 20,000 to 25,000 automotive brake drums per 8-hour shift involves an interesting and unusual series of metal fabricating, melting, centrifugal casting and handling operations. The drum is known as a combination type with an outer shell or backing of pressed steel on the inner surface of which a high grade gray iron braking surface is cast centrifugally in such a way that it fuses into the steel shell. Drums are made in double units and cut apart after the braking surface is cast into the shell. The fusing process and much of the machining used in the fusing operations, as well as some of the steel fabricating methods and equipment are covered by patents. (C.)

FORD GEAR BLANKS. *"Gear Blanks Cast Centrifugally," Iron Age,* vol. 144, no 9, August 31, 1939, pp. 27. Ford Motor Co.'s experimental work in casting gear blanks in centrifugal dies has been declared a success and is being carried out on a regular production basis. Greater strength, lighter weight and faster production are the advantages that have been developed in this process. The simplicity of the centrifugal method is noted and explained. (C.)

GERMAN DEVELOPMENT. *"Position of the Development of Centrifugal Casting in Germany,"* W. A. Geisler, *Foundry Trade Journal,* vol. 61, no. 1194, July 6, 1939, pp. 5. This article is the first part of a paper presented before the International Foundry Congress which was held in London. In this part of the paper the

author describes the historical end of the casting development in Germany and gives a number of drawings of patterned articles made by centrifugal methods. (C.)

GERMAN DEVELOPMENT. *"Position of the Development of Centrifugal Casting in Germany,"* by W. A. Geisler, *Foundry Trade Journal,* vol. 61, no. 1195, July 13, 1939, pp. 30-32. This is a continued article on centrifugal castings; this article being concerned with the development of various processes for the centrifugal casting of long pipes. The Briede-de Lavaud process is the further development of one man's idea by another, namely: the longitudional movement of mold and feed device. The process of the Vereinigte Stahlwerke and Buderus or the making of gray iron pipes in water-cooled molds is explained. A brief but concise and informative article is written on the Halbergerkutte process. Two more processes are also discussed, the Ardelt and Billand. Sand molds are used in the Ardelt system for making long pipes; while the Billand process has been the attempt of Germany to try centrifugal casting of socket pipes in the vertical position. A table showing properties of various centrifugally cast alloys is shown. Figures illustrating the various processes mentioned above are also featured. (C.)

GERMAN DEVELOPMENTS. *"Position of the Development of Centrifugal Casting in Germany,"* by W. A. Geisler, *Foundry Trade Journal,* vol. 61, no. 1196, July 20, 1939, pp. 48-50. This is the concluding article on this subject and the author discussed three subjects. A few paragraphs are written about centrifugal casting of non-ferrous metals; mainly pipes. Two processes are discussed—the Osnabrucker Kupfer und Drahtwerk and the Schwietzke. In conclusion, vertical centrifugal casting for rings, plates, double-walled tubular bodies, etc., are mentioned. (C.)

PIPE. *"Cast Soil Pipe Centrifugally,"* by Herbert H. Farr, *The Foundry,* vol. 67, no. 9, September, 1939, pp. 24-26, 72, 74. This article is concerned about a radically new method started about 2 years ago in which molds without cores are employed and where the metal is distributed by centrifugal force in a rapidly revolving mold. The process consists of lining cylindrical flasks with sand, putting them into a machine, injecting the molten iron and spinning the molds at a predetermined speed. Due to the action of centrifugal force which throws the molten metal away from the center of rotation and against the sides of the mold, the pipe is formed. (C.)

Chilled Rolls

DEFECTS. *"Defects in Electrically-Melted Chilled Rolls,"* by Franco Bondi, *Foundry Trade Journal,* vol. 61, no. 1197, July 27, 1939, pp. 60-62, 68. The advantage and disadvantage of the casting of chilled rolls melted in the electric furnace are the first things presented in this paper. General outline of the melting operation and its defects are also mentioned. Explosions during pouring are explained; how they are caused and what may be done to remedy them. Cracking is generally caused, so the author states, by molding defects, defective pouring and metal of unsuitable composition. Each one of the above defects are discussed individually. Some causes and remedies for cavities and surface flaws were also pointed out to the reader. Further topics of interest were comments on brittle necks and eccentricity and variation in hardness. (C.)

Conveyors

CONVEYOR BELTING. *"How to Select Conveyor Belting,"* M. Berman, *Pacific Factory,* vol. 50, no. 3, March, 1939, pp. 19-21. A large degree of the efficiency and economy of a conveyor system is dependent upon selection and design of the belting. Thirteen questions to guide you in specifying the needs of your particular installation are given. (M.H.)

Copper Castings

THERMAL CONDUCTIVITY. *"Copper and Copper-Alloy Castings for Electrical and Thermal Conductivity Applications,"* H. J. Miller, *Foundry Trade Journal,* vol. 61, no. 1200, August 17, 1939, pp. 117-120. This paper summarizes the alloys now being used or which are now available for special-purpose castings; this is being done because users desire to know the latest developments pertaining to the special high-conductivity and high-strength alloys which have become available within recent years. This paper has been divided into five parts (1) tough pitch copper, effect of oxygen and hydrogen, reactions on solidification, properties of tough pitch copper and oxygen-free copper (2) deoxidized copper, consideration of deoxidants and properties of deoxidized copper castings, (3) commercial copper-rich casting alloys, (4) modern high-conductivity high-strength casting alloys and copper containing chromium additions and other alloys, and (5) foundry technique. (C.)

Corrosion Prevention

METALLIC COATINGS. *"Metallic Coatings—Their Atmospheric Corrosion Resistance and Protective Value,"* S. G. Clarke, *The Metal Industry* (London), vol. 54, no. 4, July 28, 1939, pp. 87-90, and vol. 54, no. 6, pp. 133-136. In this, the first instalment of a paper read before the Electrodepositors' Technical Society, the author deals with the resistance of certain metallic coatings to outdoor exposure. The next instalment will discuss further examples of coatings exposed to similar conditions. The subjects discussed are Rate of Corrosion of Metals and Behavior of Coatings such as Nickle and Chromium. The second article describes Behavior of Lead, Aluminum, Zinc and Cadium. This second part also describes indoor conditions. (Cor.)

Cupola

CONTROL. *"Combustion Control,"* by S. C. Massari, *The Foundry,* vol. 67, no. 10, October, 1939, pp. 28-30, 98, 100. It is quite evident that the loss of elements, economy of operation and potential qualities of the iron melted are definitely a function of the atmosphere existing in the melting zone of the cupola. To accomplish greatest economy and maximum uniformity of iron seven regulations to follow are set down by the author: (1) ratio of coke to iron melted, (2) ratio of air to coke, (3) rate of combustion of the coke, (4) temperature of combustion, (5) efficiency of combustion, (6) efficiency of heat transfer to the iron and (7) losses of silicon and manganese, etc. Each of these seven rules are discussed by the author in a clear and concise manner and discussed individually to make the reader understand his points. Graphs showing stage of combustion versus melting cost, stage of combustion versus element loss, simultaneous charts from carbon dioxide and air volume recorders during manually controlled heat and sample records obtained during a typical, automatically controlled heat are facts presented by the author. (F.)

Furnaces

ALUMINUM. *"Melts Aluminum in Reverbratory Furnace,"* by F. Forrest Stretmater, *The Foundry,* vol. 67, no. 10, October, 1939, pp. 22-24, 88. Experiencing difficulties in producing their necessary 1500 lb. of aluminum for a 16 hr. day, the Servel Inc. decided to use another furnace. The company's engineers drew up plans for a 6 ton, gas fired, reverbratory furnace. Powered by a one horsepower motor, a premix burner and blower supplies the gas-air mixture to the furnace. The tap hole is so constructed and placed that it provides complete drainage. Labor on this furnace is cut down considerably, since pouring and charging is done by one man. (F.)

Gating

FLOW CONDITIONS. *"Gating with Special Reference to the Optimum Flow Conditions in the Molten Metal,"* by E. M. H. Lipo, *Foundry Trade Journal,* vol. 60, no. 1191, June 15, 1939, pp. 519-521. The aim of the paper is intended to draw attention to some laws of flow which are important for foundry practice and which permit general rules to be established for the design of casting gates. The author divided the process of pouring metal into a mold into three parts. "All the channels through which the molten metal has to pass before entering the mold proper" is the one process that this article is interested in. These channels have primarily to satisfy hydrodynamical requirements; therefore, consideration is confined almost exclusively to the channels mentioned in the above process. (Ga.)

Health

VENTILATION. *"Adequate Ventilation as a Profit Builder,"* by Fred Merish, *Steel,* vol. 105, no. 2, July 10, 1939, pp. 52-53, 77. This survey revealed that 70 per cent of the present metal producing and metal working plants in the country suffer from poor ventilation. This article also revealed that a 30 per cent increase in hot weather output is reported in many plants following the installation of modern ventilating equipment. Typical faults and remedies of many present day plants are pointed out in this survey. (He.)

Ingots

CHILL CAST INGOT. *"Inverse Segregation,"* by Joseph Alexander Vero, *The Metal Industry, (London),* vol. 54, No. 24, June 16, 1939, pp. 639-642. Two points are discussed in this article, (1) how the extent of inverse segregation changes with the progress of solidification, in the solid part of the ingot, and (2) whether and how the average composition of the solid part and that of the liquid are changed during solidification. This experiment was tried with an alloy composed of 95 per cent of commercial aluminum and 5 per cent tin, melted in a gas-fired furnace. The alloy was poured into a mold; part of the alloy was allowed to solidify, the mold was tilted and residual liquid run into a cavity made in the sand. Two radial cuts were made through the shell and the remainder of the shell machined, layer by layer, to detect segregation. Residue from the cavity solidified and was sampled by taking two radial cuts reaching the center. Solidification was found to be slow till the half cross-section of the ingot solidi-

fied and then it became more rapid. Segregation arises during solidification of the internal parts of the ingot, proving the theory that the segregation is a consequence of the migration of the residual liquid from the center towards the outside of the ingot at some stage prior to complete solidification. The author in closing his article throws new light on old theories.

Malleable Iron

TRAINING COURSE. *"Malleable Iron Training Course," The Foundry,* vol. 67, no. 10, October, 1939, pp. 27, 96. A complete malleable iron training course at Rennselaer Polytechnic institute was successfully concluded in August. This course was sponsored by the Malleable Founder's Society and was open only to employes of society members. The course had two objectives: product betterment in the industry and to provide these men with the more technical phases in the production of malleable iron. (Tr.)

Steel Castings

AIRCRAFT. *"Steel Castings in Aircraft,"* by Alexander Finlayson, *Iron Age,* vol. 144, no. 3, July 20, 1939, pp. 43-47. This study of castings used in a landing gear of a large transport plane was done to show the advancement of castings into a new field. The experiences dealing with various types of metals in order to get the necessary quality is explained by the author. Dry sand molding was used exclusively in the production of the castings. All castings are magnafluxed to discover cracks and other defects. Each landing gear is given a dynamic test. (S.)

MACHINING. *"Metallurgical Factors Affecting Machinability,"* by H. W. Graham, J. D. Armour, Philip Schane and M. N. Landis, *Metal Progress,* vol. 36, no. 1, July, 1939, pp. 53-56. This article deals only with those factors, metallurgical in character, which are in the steel. These factors fall naturally into groups relating to manufacture, composition, processing and physical characteristics. Manufacture of steel takes into consideration these topics: steel making with the Bessemer, Open-hearth and Duplex processes. Composition gives the reader information on the machinability of carbon, manganese, phosphorous, sulphur, silicon and alloying elements; inclusions are also discussed. In the processing group, hot working, cold working and thermal treatments are the methods mentioned. Grain size, hardness, tensile properties and metallographic structure are topics discussed under physical characteristics. (S.)

MELTING. *"A Little Knowledge Is a Dangerous Thing,"* by John Howe Hall, *The Foundry,* vol. 67, no. 9, September, 1939, pp. 22-23, 69-70. This is an article on the subject of electric furnace steelmaking. Since the electric furnace steelmaking in this country began with basic lined furnaces, the various operations are outlined and explained. Special attention is paid to slags and deoxidation. As there has been numerous shifts in the steelmaking processes over a period of years, so has there been one in this case. Users of the electric furnaces in foundries have shifted their production from basic to acid methods. Motives for the shift are mentioned as: lower costs and higher output on acid bottom, less difficulty in keeping the sticky slag out of the molds, and greater fluidity, making it easy to produce large tonnages of small castings. On page 69 will be found a large table containing chemical and physical properties of converter steel. (S.)

PEARLITE AND MARTENSITE. *"Genesis of Pearlite and Martensite,"* by Franklin H. Allison, *Metal Progress,* vol. 36, no. 1, July, 1939, pp. 60-64. This article is an explanation of the now famous "S" curve for plain carbon eutectoid steel, which is reproduced on the Data Sheet, page 65. According to this view the nodules of "primary troostite" are made up of fine pearlite. Likewise, a little known acicular constituent will form directly from austenite at subcritical temperatures ranging from about 900 down to 300° F. These experiments were made on a 0.78 per cent carbon steel. The "S" curve chart is made so it may be torn out and put in some place for safe keeping. (S.)

SLAG CONTROL. *"Open-Hearth Slag Control,"* W. J. Reagan, *The Iron Age,* vol. 144, no. 7, August 17, 1939, pp. 31-38. Slag fluidity undoubtedly has considerable influence on the rate of carbon drop and thus on the production of basic open-hearth steel. To control this fluidity, the viscosimeter has been found to be the best tool. Detailed data on viscosimeter technique and results obtained are included herein. The viscosimeter is a split steel forging the funnel part being connected to a 0.25 in. tube which is 10 in. long. Also the appearance of slag cokes during the working of a heat, analysis of the slags and lag of this typical heat are included. (S.)

STANDARDIZATION. *"Steel Standardization,"* by A. L. Hartley, *The Iron Age,* vol. 144, no. 10, September 7, 1939, pp. 27-33. This is a five part article which is to be continued into four more issues. This section presents the characteristics of SAE steels most generally used by machine tool builders, and sets forth the effects of various alloying elements on steel. Two constantly-sought-for objectives are available through the application of steel standardization, and they are better products at lower costs. In the September 14th issue will appear the author's first objective: the general types of steel required for parts fabricated from bar stock and forgings. The second objective, or an analysis of the physical and metallurgical requirements of each of the various types, and the third objective, an analysis of the relative merits and net costs of the various types of bar stock finishes will be discussed in the September 21st issue. The establishment of purchasing specifications is the author's fourth point, to be mentioned in the September 28th copy. Number five in the list of objectives is the establishment of a materials inspection program, and number six and final point is the establishment of a code system for each of the various grades of steel and for each heat treatment, and these points will be covered in the October 5th issue. (S.)

Testing

FATIGUE. *"Fatigue of Metals—Developments in the United States,"* by H. F. Moore, *Metals and Alloys,* vol. 10, No. 6, June, 1939, pp. 180-183. The concluding section of an article, the first part of which appeared in the May issue. In this section, the author discusses the effect of stress-raisers, fatigue damage caused by occasional overstress, methods of detection of the early stages of fatigue cracks, effect of chemical composition on fatigue, the correlation of mechanical properties, with structure, the study of fatigue failure by x-ray defraction, endurance limits and cycles of stress, stress travel and fatigue strength, etc. The author closes his discussion by asking and answering the question, "Are perfectly elastic metals desirable?"

Tire Molds

METAL. *"Metals and Alloys Used in Making Rubber Tires,"* by Edwin F. Cone, *Metals and Alloys,* vol. 10, No. 7, July, 1939, pp. 198-202. An article written about the unusual bimetallic molds used in a tire factory. Four types of molds are described, showing their specifications and compositions. A high sulphur steel casting containing 0.09 to 0.12 per cent sulphur is used in a mold for the portion forming the side walls of the tires. The reason for a high sulphur content is that a much brighter and smoother surface can be obtained. Aluminum die cast segments are made to form the tread. This aluminum alloy was chosen because of its die casting properties and freedom of distortion and growth during the various processes. A large solid aluminum sand-cast ring is used for treading large tires. Because the tread is inside the ring, the mold can be scrapped and remelted. Large crude tires are made with a steam jacket mold of cast iron. High grade steel wire of 4, 6, 8 or more strands are used on the inner circumference of the tire to give it stiffness and strength.

Statement of Ownership

Statement of the ownership, management, circulation, etc., required by the acts of Congress of August 24, 1912, and March 3, 1933, of American Foundryman, American Foundrymen's Association, published monthly at Chicago, Ill., for November 1, 1939. State of Illinois, County of Cook, ss. Before me, a notary public in and for the state and county aforesaid, personally appeared R. E. Kennedy, who, having been duly sworn according to law, deposes and says that he is the Editor of the American Foundryman, American Foundrymen's Association, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to-wit: 1—That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, American Foundrymen's Association, Inc., Chicago, Ill.; Editor, R. E. Kennedy, Chicago, Ill.; Managing Editor, N. F. Hindle, Chicago, Ill.; Business Managers, none. 2—That the owner is American Foundrymen's Association, Inc., not for profit; stock, none. Principal Officers, H. S. Washburn, President, c/o Plainville Casting Co., Plainville, Conn.; C. E. Hoyt, Executive Vice President, Chicago, Ill.; R. E. Kennedy, Secretary, Chicago, Ill. 3—That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None. 4—That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where thestockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. R. E. Kennedy, editor. Sworn to and subscribed before me this 28th day of Sept., 1939. (Seal). Jennie Reininga, Notary Public. (My commission expires Feb. 9, 1942.)

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